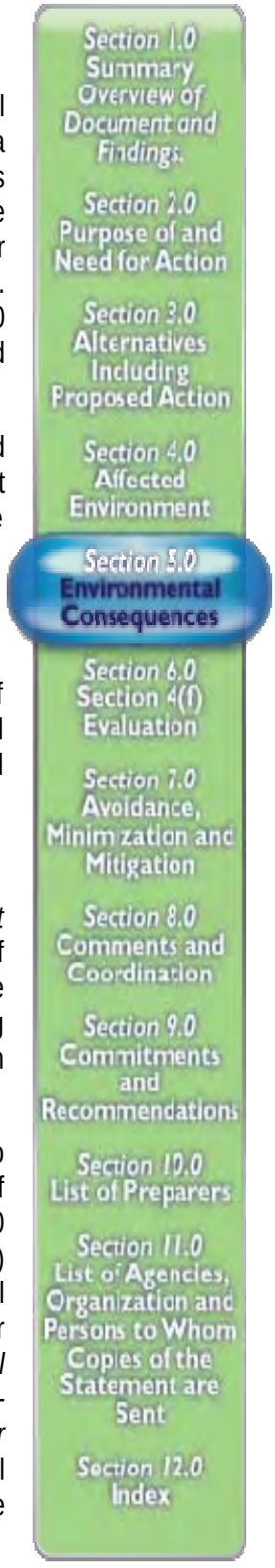
5.0 ENVIRONMENTAL CONSEQUENCES



As required under National Environmental Policy Act (NEPA), the environmental consequences section forms the scientific and analytical basis for comparing a proposed project and reasonable alternatives. The analysis of environmental impacts compares the effects of the all alternatives, including the No Build Alternative. The analysis includes considerations of direct, indirect, and cumulative effects and their significance. Agency comments and coordination are also addressed in this section. All of the alternatives under consideration are described in detail in Section 3.0 (Alternatives Including Proposed Action), including those alternatives that were rejected from further consideration.

As part of the process, an Environmental Technical Advisory Team (ETAT) comprised of planning, regulatory, and resource agencies, reviews planning and development transportation projects with respect to their agency's position on such projects. The ETAT provides comments and guidance in the determination of Degree of Effect on the community and the environment potentially affected by a transportation project. ETAT comments are entered into the Florida Department of Transportation (FDOT) Efficient Transportation Decision Making (ETDM) Environmental Screening Tool (EST). When the agency reviews are completed, all comments and recommended Degrees of Effect are documented in a Programming Summary Report that can be accessed through the EST. The Programming Summary Report for this project can be reviewed by entering the following URL into an internet web browser:

https://etdmpub.fla-etat.org/est/#8247

The summary report (published on October 6, 2008) can be accessed on the *Project Effects* tab of that web page. Appendix D contains the Programming Screen Degree of Effect Summary for the project, which includes an expanded legend that describes the meaning of each Degree of Effect. The ETAT comments, from the Programming Summary Report for this project, have been included in Appendix D along with an index of where the comments have been addressed and/or incorporated.

The Council on Environmental Quality (CEQ) regulations require all federal agencies to identify a preferred alternative in the Final Environmental Impact Statement (FEIS) if one was not recommended in the Draft Environmental Impact Statement (DEIS) (40 CFR Part 1502.14(e). As the lead agency, the Federal Highway Administration (FHWA) is responsible for the preparation and content of this EIS, which evaluates the potential environmental impacts of the Preferred Alternative. Information has been gathered for the preparation of this EIS as well as during the preparation of the *Analysis of Potential River Crossing Alternatives (to Reduce Traffic Congestion in the City of Port St. Lucie) - Part I of II, June 2008,* (*Corridor Report*), the *Crosstown Parkway Extension Corridor Alternatives Report – Part II of II, June 2008,* (*Alternatives Report*), the technical support documents to this EIS, the ETDM process, and coordination with the cooperating agencies and the public through the NEPA study process.

After a thorough analysis of the alternatives evaluation data, extensive agency coordination, the project's Public Hearing and full consideration of all comments, the FHWA has determined that Alternative 1C is the Preferred Alternative. This section describes the probable consequences (impacts and effects) due to the No Build Alternative, the build alternative, and particularly the Preferred Alternative. This section contains three general categories, covered in the same order as in Section 4.0 (Affected Environment):

- Social and Economic Resources;
- Cultural and Historic Resources; and
- Natural and Physical Resources.

Individual resources are discussed as subsections under these three general categories.

5.1 Social and Economic Resources

Direct project effects to a community principally occur as a result of right of way acquisition and business displacement. Indirect effects occur over time and often extend beyond the boundary of a community. Factors to be considered in determining social and economic impacts include, but are not limited to:

- Effects on community cohesion;
- Effects on community facilities and services;
- Mobility and safety, especially for transportation disadvantaged groups;
- Effects on demographic characteristics of the community;
- Disproportionate effects on certain demographic or economic groups, which are also referred to as Environmental Justice [Executive Order (EO) 12898)];
- Visual and aesthetic effects;
- Relocation of residents, businesses, and communities facilities;
- Disruptions of local traffic patterns and actions that could result in the isolation of some areas; and
- A loss (or gain) in community tax base.

The relative magnitude of social and economic effects can vary across communities, neighborhoods, and stakeholder groups due to differing degrees of sensitivity toward a particular issue or impact. An impact that is perceived by one community as adverse might be tolerated or even desirable by another. Guidance for social and economic impacts have been established by the Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA* [40 Code of Federal Regulations (CFR) 1508.7 and 1508.8]. Another consideration in the comparison of alternatives is the balancing of adverse and beneficial effects.

A Sociocultural Effects (SCE) evaluation was completed to evaluate the potential effects the project could have on the community and the quality of life of the citizens within the project area. Details of the evaluation are contained in the technical support document titled *Sociocultural Effects Report* and the existing conditions are described in Section 4.1.1 (Sociocultural Effects Evaluation). It is the policy of the FHWA and the FDOT to work proactively with communities in implementing the principles, concepts, and philosophy of the SCE throughout the transportation project development process.

5.1.1 Sociocultural Effects Evaluation

The SCE evaluation process focuses on the potential effects of the project on the community's social, cultural, and economic environment. Demographic evaluations were based on the Year 2010 Census data. The following sections provide an evaluation of sociocultural issues, and where applicable, their component resource subcategories. The evaluation is based upon the engineering, planning, and environmental analyses performed for each of the build alternatives. The evaluation takes into account community impacts resulting from changes to the community, as a result of the project, such as street closures, relocations, division of neighborhoods, and changes to community cohesion. The effects of the No Build Alternative are also included in the discussion of impacts. Table 5.1 provides a summary of the evaluation results in terms of the "Degree of Effect"[1] for each sociocultural element.

5.1.1.1 Social Impacts

5.1.1.1.1 Demographics

The No Build Alternative would not affect the demographics of the project area; a new bridge would not be constructed and it is anticipated that the demographic makeup of the communities on both sides of the North Fork St. Lucie River (NFSLR) would remain unchanged. All build alternatives would involve the construction of a 6-lane parkway through established residential communities, with Alternatives 2A, 6B, and 6A bisecting several residential streets on the west side of the NFSLR (Alternatives 2D, 1C, and 1F would use existing roads). All build alternatives, including the Preferred Alternative, would result in the displacement of residential housing. These potential impacts are further discussed in Section 5.1.1.1.2 (Community Cohesion) and in Section 5.1.1.5 (Relocation).

None of the build alternatives, including the Preferred Alternative, will disproportionately impact low-income populations or affect the demographic makeup of the residential communities. Because the project area is already highly developed, the City of Port St. Lucie's (City) overall population is expected to increase in response to regional factors unrelated to the project. The population projections conducted by the University of Florida, released in March 2012, indicate that St. Lucie County (County) is expected to be the fifth fastest growing county in the State of Florida between 2011 and 2040 with a 78 percent increase in population by 2040 and a growth rate equivalent to that seen in the early and mid 2000s. Despite the economic downturn that began in 2008, St. Lucie County's population grew 44.2 percent between the Year 2000 and Year 2010 censuses while Florida, as a whole, grew 17.6 percent[2]. It is anticipated that any future growth in the project area will be in accordance with the City of Port St. Lucie Comprehensive Plan (City Comprehensive Plan).

[1] In the evaluation of sociocultural effects, a Degree of Effect is assigned, by identifying and quantifying changes in the community that may result from the implementation of a transportation facility. The evaluation is conducted for six issues: social, economic, land use, mobility, aesthetics, and relocation. A number of subcategories in each issue category are also considered. Each issue category is evaluated in this section, based on project-specific information and through public involvement. The results of the sociocultural evaluation are summarized in Table 5.1 and are not to be confused with the results of the ETDM Programming Screen contained in Appendix D.

[2] http://quickfacts.census.gov/qfd/states/12/12111.html, accessed July 24, 2012

Table 5.1 Summary of Evaluation Results for Sociocultural Issues [1]

Sociocultural Issue	ALTERNATIVE					
	2A/ETDM 2	2D/ETDM 3	1C/ETDM 1	1F/ETDM 6	6B/ETDM 5	6A/ETDM 4
Social						
Demographics	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Community Cohesion	Moderate	Substantial	Moderate	Moderate	Moderate	Substantial
Economic	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Land Use	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Mobility						
Regional Mobility	Enhanced	Enhanced	Enhanced	Enhanced	Enhanced	Enhanced
Local Mobility	Substantial	Substantial	Moderate	Moderate	Moderate	Substantial
Regional Safety/ Emergency Response	Enhanced	Enhanced	Enhanced	Enhanced	Enhanced	Enhanced
Local Safety/ Emergency Response	Enhanced	Moderate	Enhanced	Enhanced	Enhanced	Enhanced
Aesthetics [2]	Minimal	Minimal	Minimal	Moderate	Moderate	Substantial
Relocation						
Residential Relocation and Displacement	Substantial	Substantial	Moderate	Substantial	Substantial	Substantial
Environmental Justice	None	None	None	None	None	Minimal
Business Relocation and Displacement	Minimal	None	None	Moderate	Moderate	Moderate
Public Facilities and Services [3]	None	None	None	None	None	None

[1] Table reflects results of alternatives analysis made during the preparation of the EIS and are not the results of the ETDM Programming Screen. The alternatives are identified differently in ETDM; for a comparison with ETDM, the ETDM alternative number is shown.

[2] See discussion of aesthetics in Section 5.3.2 (Visual and Aesthetic) and noise in Section 5.3.4 (Noise).

[3] Does not include the NFSLR Aquatic Preserve or the Savannas Preserve State Park. They are considered separately as public parks [Section 6.0 (Section 4(f) Evaluation)].

The rest of this page is intentionally left blank

Alternatives 1F, 6B, and 6A have the potential to affect the La Buona Vita neighborhood, which is a cooperative community made up exclusively of a population older than 55 years. Costs to operate and maintain the cooperative are divided among lot owners within the community. If residents are removed, the monthly costs will increase for the remaining owners. Alternatives 1F and 6B would involve the relocation of up to 21 of the 189 (11.1 percent) residences on the southern side of this community, while Alternative 6A would relocate the community access from U.S. 1 to the Crosstown Parkway Extension, to the rear of the community. Even though the demographics of this community would not be expected to change under Alternatives 1F or 6B, the reduced number of residences would affect the remaining residences by increasing their shared cost. Economic impacts are discussed further in Section 5.1.1.2 (Economic Impacts). Despite these impacts, none of the build alternatives, including the Preferred Alternative, would have an appreciable effect on the overall demographic character of any of the communities in or around the project area. Thus, the Degree of Effect on demographics is "minimal" for all build alternatives, including the Preferred Alternative.

Based on this analysis, the Preferred Alternative will not appreciably increase or decrease minority or low-income populations, nor is it anticipated that it will affect the demographic makeup of the residential communities. Because the project area is already highly developed, no increases or decreases in overall population are expected. The City's overall population trends are expected to respond to regional factors unrelated to the Preferred Alternative.

5.1.1.1.2 Community Cohesion

Community cohesion is the degree to which residents have a sense of belonging to their neighborhood or community, including a level of attachment to neighbors, institutions, or particular subgroups. Cohesion includes the degree of social networking, including the degree to which residents cooperate and interact. A community's roadways and bicycle and pedestrian pathways can provide the means to physically connect with each other. Section 4.1.1.4 (Transit and Mobility) describes the existing roadway network within the project area, particularly the north-south and east-west routes that provide connectivity within the study area. Where roadways are constructed or bisect existing communities, community cohesion can be reduced and connected neighborhoods can be more difficult to access.

Under the No Build Alternative, a new bridge would not be constructed and the separation of communities on both sides of the NFSLR would remain unchanged. Regional and local traffic movements within the communities on each side of the NFSLR would remain unchanged. Increased traffic volumes along the constrained roadway network would likely lead to a more congested network, thus hampering the traffic flows.

All build alternatives, including the Preferred Alternative, would enhance regional cohesion by providing a connection across the physical barrier of the NFSLR. In contrast to the regional benefit, all build alternatives, including the Preferred Alternative would affect the local communities by the construction of a new 6-lane parkway through established communities on the west side of the NFSLR. Each of the build alternatives would impact the cohesion to differing degrees by relocating residents in the path of the project and by dividing the neighborhoods north of the new parkway from those on the south side. These impacts become more substantial where the roadway alignment cuts diagonally and for longer distances through the neighborhood.

Construction of any of the build alternatives, including the Preferred Alternative, (a 6-lane divided, controlled access parkway) requires the construction of numerous modifications to neighborhood streets. More specifically, new dead-end roads and cul-de-sacs would be introduced along various roadways abutting the project, including some of the north-south or east-west roadways that provide roadway continuity within and between neighborhoods. In some cases, residential streets, which previously provided connections to roadways out of the neighborhood, would be directed back into the neighborhood (providing a connection to one or more adjacent streets, as opposed to simply terminating in a dead-end road). In other cases, the median would not allow through traffic or left turns out of the neighborhoods or left turns into the neighborhoods. Each of these roadway modifications could have a negative impact on neighborhood cohesion because residents would find it more difficult to interact with those residents on opposite sides of the street, on adjacent streets, or a few blocks away.

As the alternatives were developed, design engineers and traffic engineers worked together with the intent of minimizing the impacts of changes to the surrounding neighborhoods. Efforts were made to maintain access to/from residential areas at major cross streets. Also, efforts were made to connect the internal street system (as opposed to simply terminating them) so that mobility within the neighborhood could be facilitated. Input from the police and school board was solicited at a meeting on April 28, 2009 where the concepts were presented and discussed. Based on feedback from that outreach, the placement of median openings was further reviewed to address U-turn opportunities for motorists, where practical. The roadway modifications were also displayed at the Alternatives Public Workshop on June 4, 2009 to explain the proposals and solicit feedback on the concepts. A separate station was set up and staffed by senior project team members to address questions and explain the concepts (Photos 5.1, 5.2, and 5.3).

Photo 5.1. Concept Plan Station at Alternatives Public Workshop June 4, 2009

Photo 5.2. Concept Plan Station at Alternatives Public Workshop June 4, 2009

Photo 5.3. Concept Plan Station at Alternatives Public Workshop June 4, 2009

On the east side of the NFSLR, the cohesion between established communities is less affected because the project does not bisect or fragment communities, although some roadway modifications would still be required. Table 5.2 summarizes the roadway and continuity modifications that would be required under each of the build alternatives.

Currently, pedestrians and bicyclists can cross the existing transportation corridor at the location of any of the intersecting streets because existing roadways are 2-lane roads. The construction of any of the build alternatives, including the Preferred Alternative, will eliminate many of these cross street access points. In addition, the crossing distance and the amount of traffic encountered by pedestrians and bicyclists who wish to cross the project would be greater, which could provide a crossing deterrent for pedestrians who are less mobile. Further information on minimization of social impacts is discussed in Section 7.2.2 (Social Environment).

Table 5.2 Summary of Roadway Modifications Required under Each Build Alternative

	Roadway Modifications				Continuity Modifications		
Alternative	Cul-de-sacs and Dead Ends	Redirected Roads	Restricted Access Roads	Total	North-south Continuity Cuts[1]	East-west Continuity Cuts[2]	Total
2A	10	7	5	22	5/6	2/3	7/9
2D	9	10	8	27	5/6	0/3	5/9
1C	6	4	6	16	4/6	0/3	4/9
1F	6	4	6	16	4/6	0/3	4/9
6B	6	6	6	18	4/6	1/3	5/9
6A	11	8	6	25	3/6	2/3	5/9

[1] For example, 5/6 means that of the 6 roads that currently provide relative north-south continuity or connectivity within the neighborhood (Manth Lane, Ocean Lane, Preston Lane, Floresta Drive, Bayharbor Street, and Coral Reef Street) 5 would become discontinuous or disconnected roads as a result of that alternative, creating increased impairment to neighborhood interaction.

[2] For example, 2/3 means that of the 3 roads that currently provide relative east-west continuity or connectivity within the neighborhood (Walters Terrace, West Virginia Drive, and Evergreen Terrace) 2 would become discontinuous or disconnected roads as a result of that alternative, creating increased impairment to neighborhood interaction.

All build alternatives, including the Preferred Alternative, enhance cohesion between the communities east and west of the NFSLR, especially for emergency evacuations. In other words, regional cohesion would be enhanced. However, this section also examines the additional effects of each alternative on the local roadway network, and assigns a Degree of Effect for local mobility. Each of the build alternatives have differing impacts on community cohesion.

- Alternative 2A would traverse diagonally (approximately 0.3 miles) from Manth Lane to the southeast across four residential streets and would change traffic patterns in these areas. However, the alignment would not cause the isolation of any neighborhoods since these streets are short blocks that do not connect to other neighborhood streets. The alignment would then follow the existing Walters Terrace corridor eastward to the NFSLR. Walters Terrace would be incorporated into the new 6-lane parkway and would no longer provide east-west connectivity to the abutting neighborhoods where connecting residential streets will become dead-ends or redirected streets away from the Crosstown Parkway Extension.

Full access (left turns, through movements, and right turns from all directions) to the Crosstown Parkway Extension west of the NFSLR along this route would be available only at Floresta Drive. Floresta Drive would remain open under this alternative. Right turns onto and right turns off of the Crosstown Parkway Extension would be allowed at Manth Lane. For the neighborhoods along Veterans Memorial Parkway west of U.S. 1, the existing full access point at Highpoint Drive/Colchester Circle would be altered to allow only right turns in and right turns out, although a new full access point to the neighborhood on the north would be added into the west side of the neighborhood, altering traffic patterns in this part of that neighborhood. A full intersection would be provided at U.S. 1.

Construction of this alternative would create a total of 22 roadway modifications (Table 5.2) within the local roadway network, and would interrupt a majority of the north-south and east-west roads (7 of 9) that currently provide localized connectivity within the area (Figure 5.1). Geometric improvements to the intersection of Floresta Drive and the Crosstown Parkway Extension would eliminate access to/from Bywood Avenue at Floresta Drive (south of Walters Terrace) which provides secondary access to Floresta Elementary School; and would create a right turn in and right turn out only condition for the houses along Floresta Drive north of the Crosstown Parkway Extension up to and including where Brookedge Avenue intersects Floresta Drive.

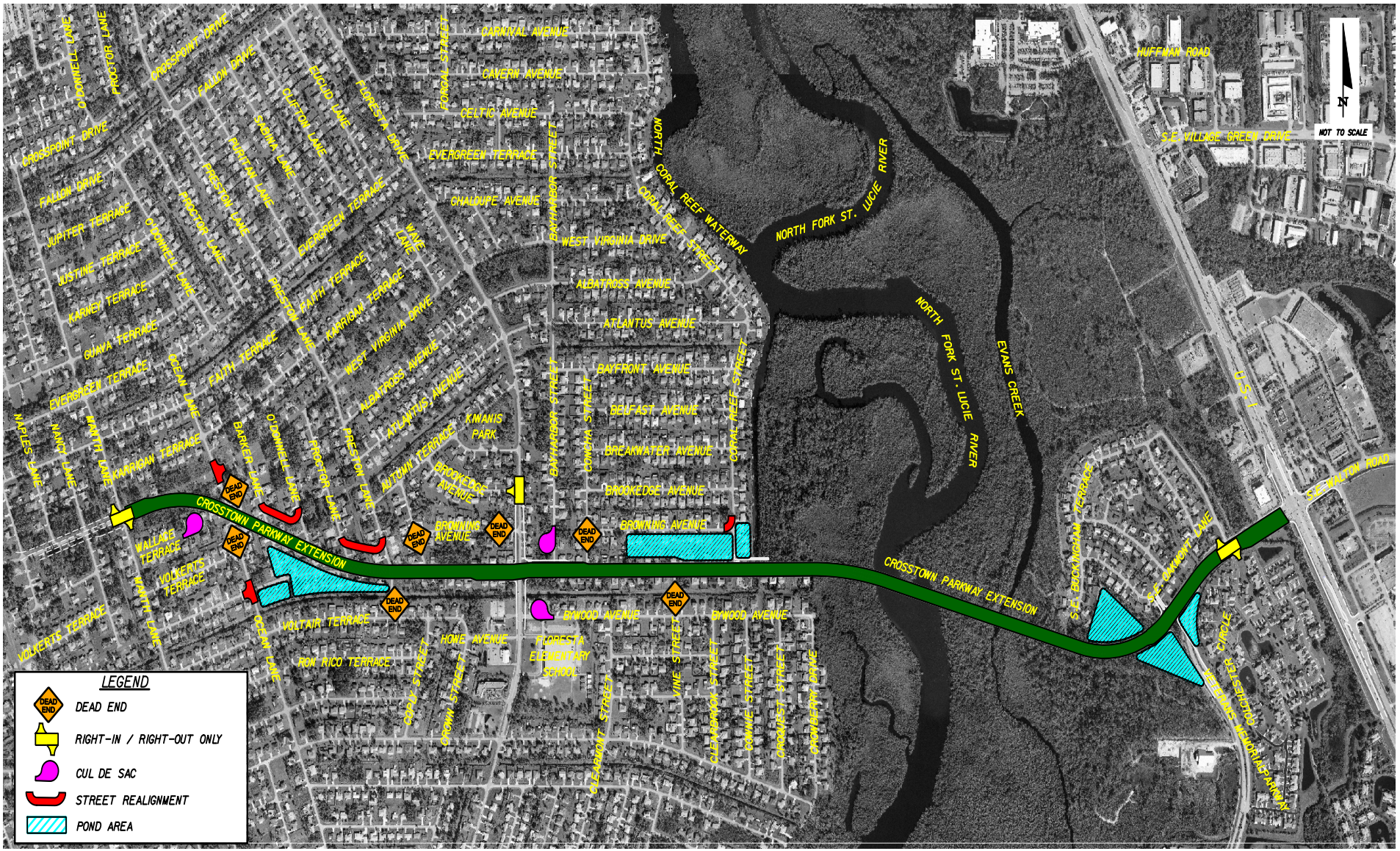
Although this alternative would disrupt the largest number of continuous roadways in the area affecting local mobility, the impact to community cohesion and extent of community disruption would not be as great as Alternatives 1F, 6B, 6A, and 2D because an existing canal runs parallel to and south of Walters Terrace. This canal already provides an existing natural barrier to north-south travel between communities. Within the study area the canal can currently be crossed only at Floresta Drive.

Based on the above, the Degree of Effect for Alternative 2A for community cohesion is "moderate".

- Alternative 2D would use existing roadways (West Virginia Drive, Floresta Drive, and Walters Terrace) to accommodate the new 6-lane Crosstown Parkway Extension. It does not traverse diagonally across existing neighborhoods, but would require modifications to the abutting neighborhood street system. In addition, a stormwater pond would be located at the southeast quadrant of the intersection of West Virginia Drive and Floresta Drive.

  The combination of the stormwater pond and the reduced access to the 6-lane parkway has the additional effect of partially isolating the community between West Virginia Drive and Walters Terrace east of Floresta Drive (approximately 100 homes; Figure 5.2). The only east-west access into this neighborhood would be via the remaining portion of West Virginia Drive east of Floresta Drive (north-south access would still be provided to/from the north via Bayharbor Street and Coral Reef Street). Floresta Drive would remain open under this alternative.

  Full access (left turns, through movements, and right turns from all directions) to the Crosstown Parkway Extension west of the NFSLR along this route would be available at the intersections of Floresta Drive with West Virginia Drive and with Walters Terrace. Right turns onto and right turns off of the Crosstown Parkway Extension would be allowed at Manth Lane, Preston Lane, and Autumn Terrace. Changes to the access to the neighborhood at the northwest quadrant of Veterans Memorial Parkway and U.S. 1 would be the same as Alternative 2A, including a full intersection at U.S. 1.

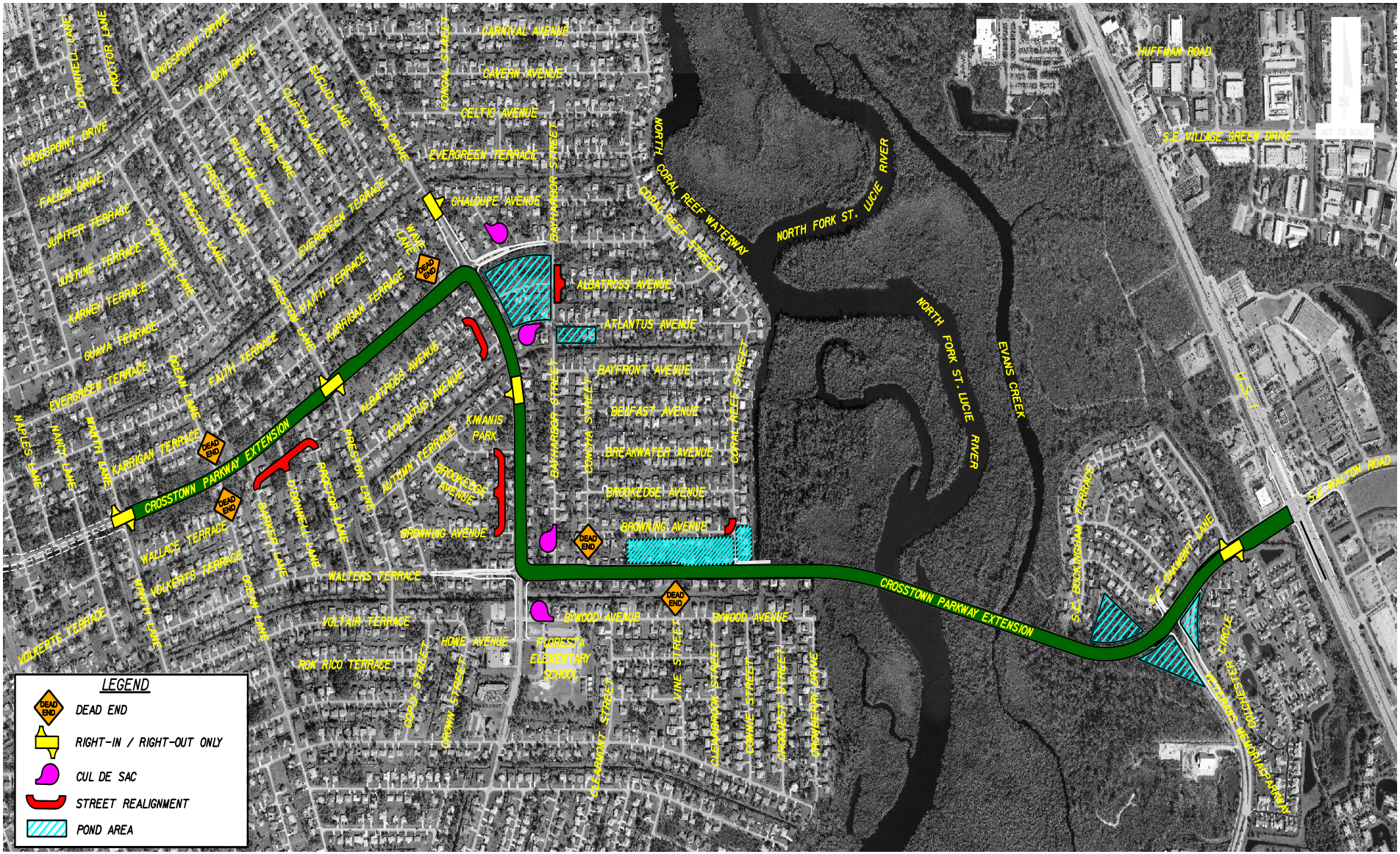


FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Neighborhood Circulation and Mobility Modifications - Alternative 2A

Figure 5.1



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Neighborhood Circulation and Mobility Modifications - Alternative 2D

Figure 5.2

Construction of this alternative would not impact connectivity of any of the three east-west neighborhood connecting roadways, but does disrupt most (5 of 6) of the north-south local connector roadways. Additionally, construction of this alternative would create the highest number of total roadway modifications (27). Geometric improvements at the intersection of Crosstown Parkway Extension and Floresta Drive would create a right turn in and right turn out only condition for houses along Floresta Drive north of West Virginia Drive up to and including Chaloupe Avenue. Geometric improvements at the intersection of Crosstown Parkway Extension and Walters Terrace would eliminate access to/from Bywood Avenue at Floresta Drive (south of Walters Terrace) which provides secondary access to Floresta Elementary School. The Degree of Effect for Alternative 2D for community cohesion is "substantial".

- Alternative 1C (Preferred Alternative) will use the alignment of existing West Virginia Drive west of the NFSLR. The alignment does not traverse diagonally across existing neighborhoods. West Virginia Drive will be incorporated into the new 6-lane Crosstown Parkway Extension but will no longer provide the same degree of connectivity to the adjacent neighborhoods. Existing connecting residential streets will become dead ends or streets redirected away from the new parkway. In addition, a stormwater pond will be located at the southeast quadrant of the intersection of West Virginia Drive and Floresta Drive.

  Full access (left turns, through movements, and right turns from all directions) to the Crosstown Parkway Extension will be provided at the intersection of the Floresta Drive and at the intersection of U.S. 1. Right turns onto and right turns off of the Crosstown Parkway Extension will be allowed at Manth Lane and Preston Lane.

  To minimize impediments to crossing the parkway, new signalized crosswalks will be constructed at Floresta Drive, which is the primary north-south roadway crossing the project. The signals will be timed to accommodate the slower walking speed of elderly and/or disabled residents. Incorporation of pedestrian and bicycle facilities along the project will facilitate pedestrian and bicycle mobility to safe crossings, where currently no such accommodations exist.

  This alternative will require the fewest number of roadway modifications (16, but the same as Alternative 1F). All of the current east-west roadways that provide continuity through the study area will remain, but two-thirds (4 of 6) of the north-south connector roadways will be disrupted (Figure 5.3). Coral Reef Street, which parallels the NFSLR, will pass underneath the new bridge, maintaining the connectivity of that street. Floresta Drive will also remain open under this alternative. Geometric improvements at the intersection of Crosstown Parkway Extension and Floresta Drive will create a right turn in and right turn out only condition for houses along Floresta Drive north of West Virginia Drive up to and including Chaloupe Avenue, and to Albatross Avenue on the west side of Floresta Drive south of Crosstown Parkway Extension. The pond in the southeast quadrant of the Crosstown Parkway Extension and Floresta Drive intersection will eliminate access to Albatross Avenue east of Floresta Drive. This alternative will not affect any neighborhoods on the east side of the NFSLR but it passes through undeveloped park lands [a Section 4(f) resource, an issue discussed in greater detail in Section 6.0 (Section 4(f) Evaluation)]. The Degree of Effect for Alternative 1C for community cohesion is "moderate".

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Neighborhood Circulation and Mobility Modifications Alternative 1C

Figure 5.3

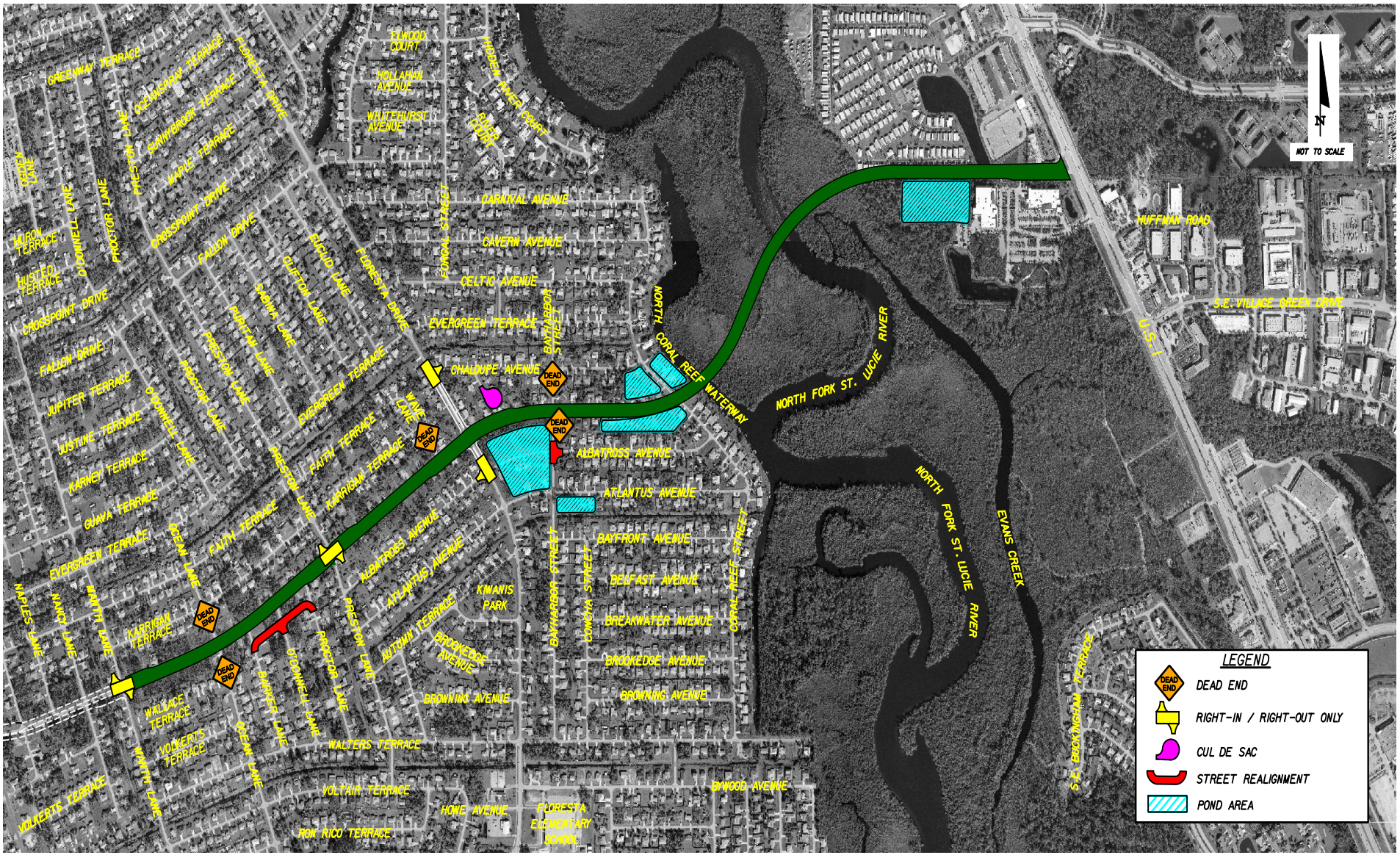
- Alternative 1F has identical impacts to the neighborhoods on the west side of the NFSLR as Alternative 1C because it uses the same alignment on the west side of the NFSLR. Construction of this alternative would require the fewest number of roadway modifications (16, but the same as Alternative 1C). This alternative would have the same impact to the connectivity of the neighborhoods as Alternative 1C (Figure 5.4). However, this alternative would impact the neighborhood on the east side of the NFSLR. Construction of this alternative would require the same geometric improvements at the Floresta Drive intersection as Alternative 1C resulting in the same right in and right out conditions for Chaloupe Avenue and Albatross Avenue. This alternative would additionally cause 21 more residential relocations than Alternative 1C east of the NFSLR (in La Buona Vita neighborhood). While these additional neighborhood impacts result in other social impacts, the Degree of Effect for Alternative 1F for community cohesion is "moderate".

- Alternative 6B would traverse the same alignment as Alternatives 2D, 1C, and 1F up to Floresta Drive, then would traverse diagonally (approximately 0.45 miles) from Floresta Drive to the northeast across three residential streets, and would change traffic patterns in this area. Floresta Drive would remain open under this alternative. It has similar impacts to neighborhood access and cohesion as Alternatives 1C and 1F, by reducing the north-south continuous roads by two-thirds (4 of 6), but would require two additional roadway redirections (a total of 18 modifications; Figure 5.5). It would also disrupt one north-south connector road (1 of 3). Construction of this alternative would have identical impacts as Alternative 1F to La Buona Vita neighborhood. The Degree of Effect for Alternative 6B for community cohesion is "moderate".

- Alternative 6A would traverse the same alignment as Alternatives 2D, 1C, 1F, and 6B up to Floresta Drive, then would traverse diagonally from Floresta Drive northeast across six residential streets, and would substantially change traffic patterns in this area. The length of the diagonal cut through the local residential community would be more extensive (approximately 0.5 miles) than any of the other alternatives which include a diagonal alignment.

  Similar to Alternatives 1C, 1F, and 6B, full access (left turns, through movements, and right turns from all directions) to the Crosstown Parkway Extension would be provided at the intersection of Floresta Drive and at the intersection of U.S. 1. Floresta Drive would remain open under this alternative. Right turns onto and right turns off of the Crosstown Parkway Extension would be allowed at Manth Lane and Preston Lane. Construction of this alternative would require the same geometric improvements at the Floresta Drive intersection as Alternatives 1C, 1F, and 6B, resulting in the same right in and right out conditions for Chaloupe Avenue and Albatross Avenue.

  This alternative would require a total of 25 roadway modifications within the local roadway network (Figure 5.6), and would cause the disruption to two-thirds (2 of 3) of the east-west connector roadways and half (3 of 6) of the north-south connector roadways. In addition, this alternative would require the relocation of the entrance road to La Buona Vita neighborhood east of the NFSLR, and would require a new access to be created into the rear of the community. This would change the traffic flow towards the rear of the community where currently only limited local traffic exists. Based on this evaluation, the Degree of Effect for Alternative 6A for community cohesion is "substantial".

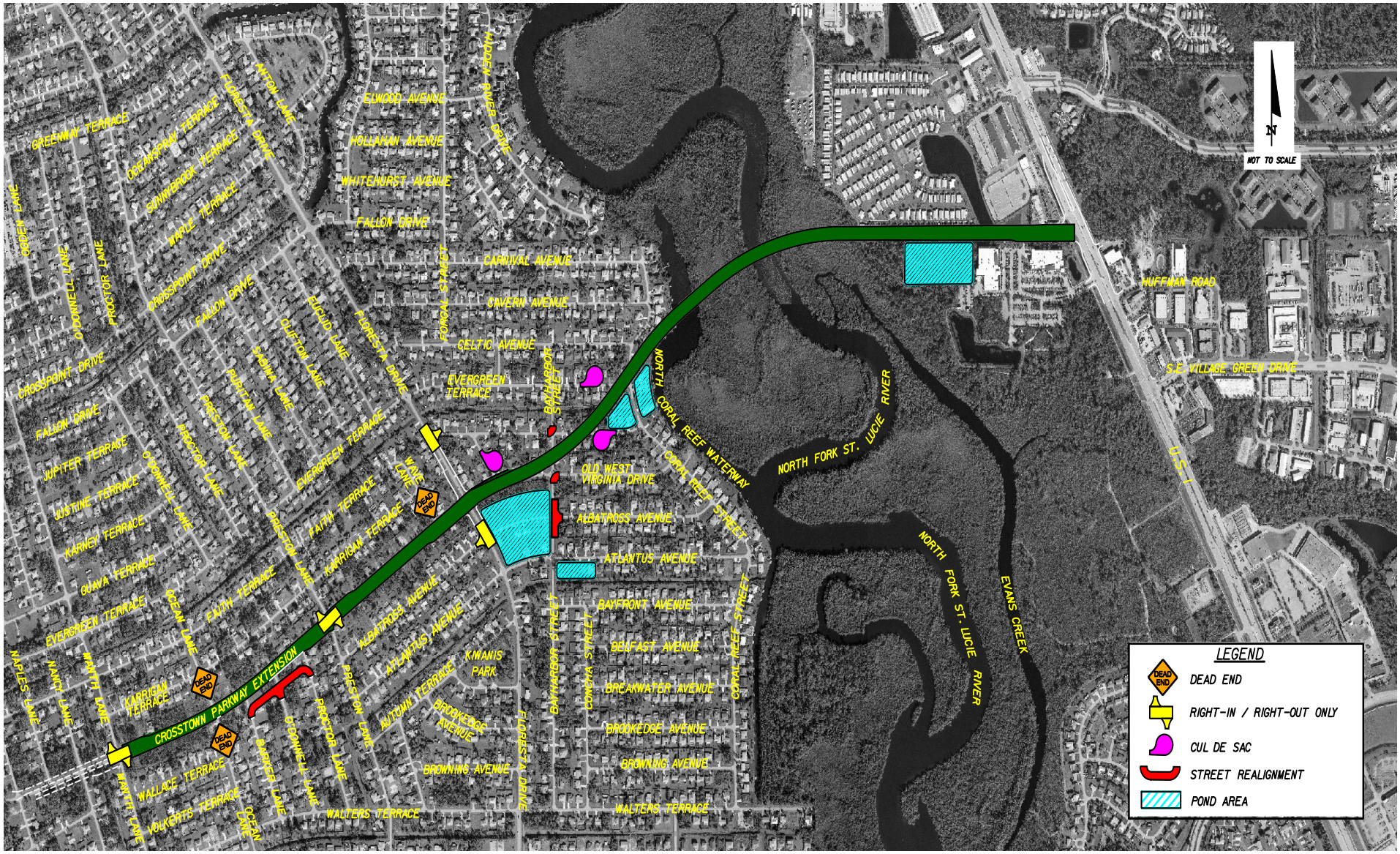


FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Neighborhood Circulation and Mobility Modifications - Alternative 1F

Figure 5.4

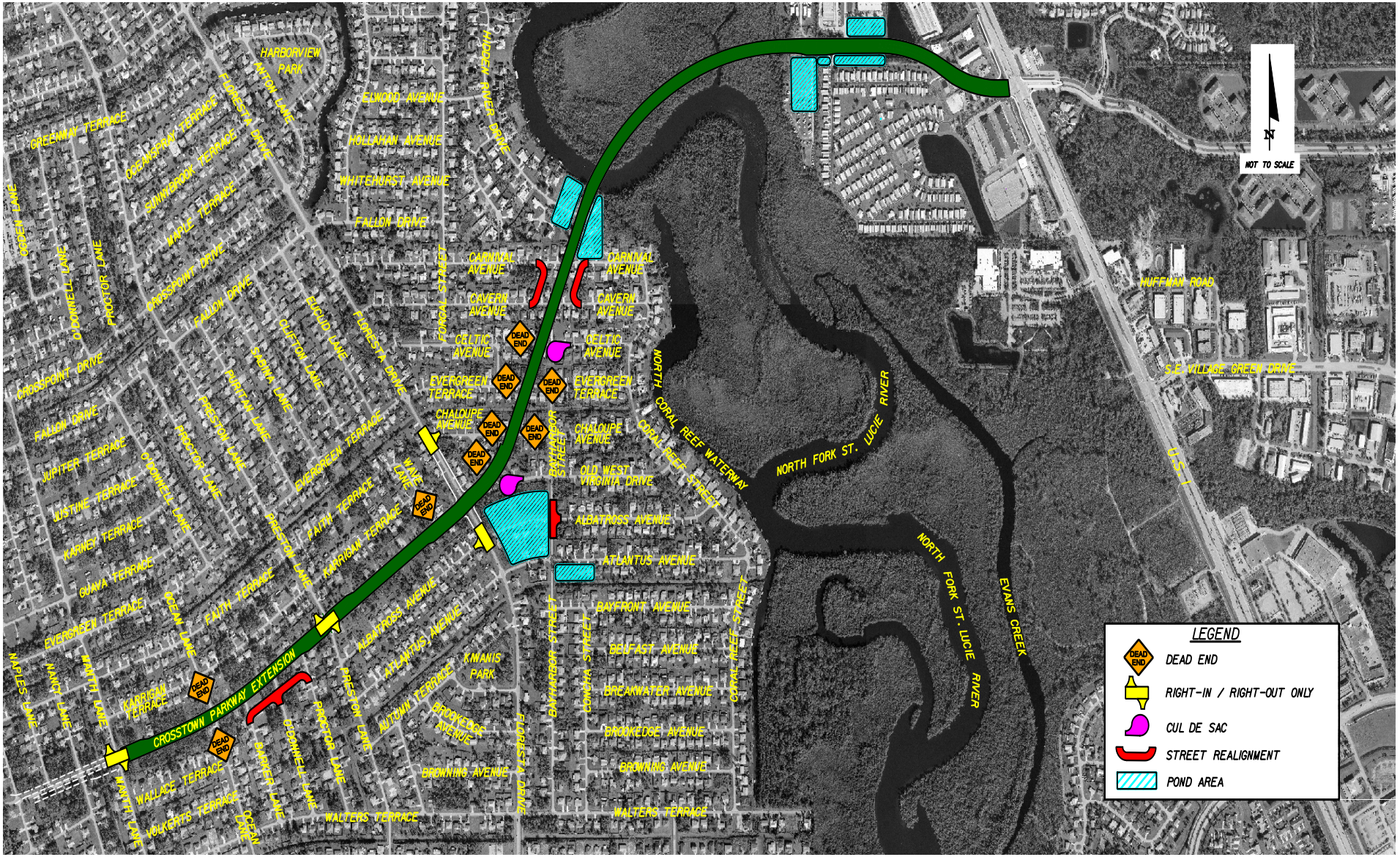


FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Neighborhood Circulation and Mobility Modifications - Alternative 6B

Figure 5.5



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Neighborhood Circulation and Mobility Modifications - Alternative 6A

Figure 5.6

5.1.1.1.3 Safety / Emergency Response

5.1.1.1.3.1 Regional Emergency Response

The evaluation of neighborhood safety is broadly defined to include whether individual residents feel safe in their neighborhood, as well as emergency services and bicycle/pedestrian safety. Figure 4.2 in Section 4.0 (Affected Environment) identifies the emergency and medical facilities within or in the immediate vicinity of the project area. Port St. Lucie Boulevard and Prima Vista Boulevard are the only current means for emergency vehicles to cross the NFSLR within the project area. These routes connect with U.S. 1 and I-95, and are designated hurricane evacuation routes. These routes were also identified as two of the critical evacuation routes for hurricanes and for nuclear emergencies at the St. Lucie Nuclear Power Plant (Figure 5.7). The St. Lucie County Emergency Management Coordinator (EMC) stated that the project would have a positive impact on facilitating any necessary evacuation with a direct route to I-95. The EMC also noted that FPL is updating their evacuation plan and the Emergency Management office asked them to add the existing portions of Crosstown Parkway to their evacuation network with the consideration that it may eventually connect to U.S. 1 (Appendix I).

The No Build Alternative would maintain the existing roadway system. Under this alternative, Port St. Lucie Boulevard and Prima Vista Boulevard would continue to provide the only crossings of the NFSLR within the project area for emergency vehicles and for emergency evacuations. Without any improvements, traffic congestion would increase and travel time/emergency response time would increase. All of the build alternatives, including the Preferred Alternative, would likely improve (decrease) the response time for emergency fire, police, and emergency medical services, especially across the NFSLR. The City met with representatives of the City Police Department, City Fire Department, and the School District during a "Cul-de-Sac" Meeting held on April 28, 2009 regarding access management impacts and proposed cul-de-sacs for the project [Section 8.6 (Interagency Coordination and Consultation)]. Recommendations from that meeting were reviewed and incorporated into the concept plans where practical. A Degree of Effect of "enhanced" is assigned for mobility.

5.1.1.1.3.2 Corridor Safety

The Preferred Alternative will have wide medians and shoulders, a limited number of signalized intersections, and no commercial or residential driveways, which will minimize potential conflicts between vehicles and emergency vehicles. A reduction of friction associated with potential traffic conflicts will improve safety to all vehicle types by reducing the frequency of stops and related acceleration and deceleration maneuvers. Further, by maintaining similar operating speeds among cars and heavy vehicles traffic flow will be improved and overall corridor capacity will be increased.

5.1.1.1.3.3 Local Emergency Response

Emergency response time within the residential neighborhood in the project area will be affected by the project. For all build alternatives, except for Alternative 2D, multiple access locations to the neighborhoods would be maintained to all residential and commercial properties. Alternative 2D would create the partial isolation of the neighborhood east of Floresta Drive between West Virginia Drive and Walters Terrace as

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

St. Lucie County Evacuation Routes

Figure 5.7

discussed in Section 5.1.1.1.2 (Community Cohesion). West Virginia Drive would be the primary east-west roadway providing access to this entire area. This could create longer response times to the residences located furthest south from West Virginia Drive. An additional access point could be provided to address this issue but, because existing roads are aligned parallel to either Floresta Drive or Walters Terrace, an additional intersection would involve one or more additional relocations. Coordination with police, fire, and school officials has been ongoing to ensure access will be maintained to all parts of the project area [Section 8.0 (Comments and Coordination)].

The Degree of Effect on safety/emergency response on a regional level (to cross the NFSLR) is "enhanced" for all build alternatives. However, on a local level (within local neighborhoods), the Degree of Effect on safety/emergency response is "enhanced" for all build alternatives except for Alternative 2D, which would result in the partial isolation of the neighborhood east of Floresta Drive between West Virginia Drive and Walters Terrace. The Degree of Effect for this alternative is "moderate."

5.1.1.1.3.4 Safety/Emergency Response (Preferred Alternative)

The traffic analysis confirmed that travel times are improved under the Preferred Alternative due to the reduction in traffic congestion on Port St. Lucie Boulevard and Prima Vista Boulevard, the additional capacity across the NFSLR, and the resulting improved traffic circulation throughout the project area. The Preferred Alternative will improve travel time to the St. Lucie Medical Center from the Prima Vista Boulevard and Bayshore Boulevard intersection 3.4 minutes better than the No Build Alternative. The improvement in travel time to the St. Lucie Medical Center from the Port St. Lucie Boulevard and Bayshore Boulevard intersection is 4.9 minutes better than the No Build condition. The project will improve the emergency response time along the parallel corridors. The Preferred Alternative will improve travel time because the roadway will have fewer access points, which will minimize traffic conflicts and traffic friction, compared to the existing Prima Vista Boulevard and Port St. Lucie Boulevard corridors.

5.1.1.2 Economic Impacts

The impact of a transportation project has the potential to modify employment levels, types of jobs, per capita income, poverty rates, unemployment rates, the range of incomes in the community, and trends in employment opportunities. The No Build Alternative would have no effect on the economic activity in the vicinity or within the project area. All of the build alternatives have the potential for modifying economic conditions.

On the west side of the NFSLR, the project area is predominantly residential single-family homes, while on the east side of the NFSLR the project area contains a mix of residential, business, and park land uses. The build alternatives would require the purchase of residential and business properties, thereby removing these parcels from the tax rolls. Table 5.3 summarizes the taxes that would be removed by each alternative from the County and the City tax rolls. For 2008, the total tax base in the City was $287,490,799 and the total tax base in the County was $495,621,567. Alternative 2A would remove more of the City and County tax base than any other of the build alternatives, followed by Alternative 2D. Alternative 1C (Preferred Alternative) would remove the least. However, it is anticipated that any of the build alternatives would enhance long term economic growth due to increased roadway capacity improvements within the tax base, resulting in a long term net gain. In addition to the tax roll impacts summarized in Table 5.3, Alternative 1F or 6B, would have an additional economic impact to the residents of La Buona Vita on the

east side of the NFSLR, which is a housing cooperative made up largely of retired residents on a fixed income. Alternatives 1F and 6B would remove of 21 of the 189 homes in this community, causing the costs to operate and maintain the cooperative to increase by 12.5 percent for the remaining owners. Despite this effect for Alternatives 1F and 6B, because economic impacts are evaluated on a regional scale, the Degree of Effect for economic impacts is "minimal" for all build alternatives, including the Preferred Alternative.

Table 5.3 Summary of Tax Base Impact

Tax Base[1]	Alternative					
	2A	2D	1C	1F	6B	6A
City Taxes Removed	$308,993	$275,389	$102,629	$98,045	$142,766	$169,325
Percent of Total City Tax Base	0.1075%	0.0958%	0.0357%	0.0341%	0.0497%	0.0589%
County Taxes Removed	$308,993	$275,389	$102,629	$140,358	$244,118	$279,998
Percent of Total County Tax Base	0.0623%	0.0556%	0.0207%	0.0283%	0.0493%	0.0565%

Based on 2008 Tax Rolls. Due to the economic downturn, the 2011 tax base in the City of Port St. Lucie dropped to $232,341,850 and the 2011 tax base in St. Lucie County dropped to 391,696,110. This equates to a drop in tax base of approximately 19.2% and 21.0%, respectively since 2008. As such the percentage impact should still be approximately the same.

Most businesses are located along U.S. 1, Port St. Lucie Boulevard, and Prima Vista Boulevard. Construction of the Preferred Alternative could have an impact on local businesses due to the temporary rerouting of traffic and disruption of traffic flow. These impacts could lead to temporary lost business revenue. The number of business impacts are relatively small, compared to the region and that special considerations will be made during construction to mitigate for these negative impacts. These types of construction considerations are addressed in Section 5.3.19 (Construction). Over the long term, it is anticipated that the Preferred Alternative will improve access and visibility to the commercial businesses along the major corridors (especially U.S. 1). In addition, traffic analysis demonstrated that for those businesses depending on pass-by traffic, a substantial amount of traffic will remain along the existing commercial corridors, even with the anticipated changes in traffic flows from the implementation of the Preferred Alternative.

The project area is relatively small (compared to the regional economic market) so that economic conditions will be predominately determined by external regional and national factors. Based on current economic conditions, the probability of an increase in development of undeveloped areas may be low for several years, with or without this project. However, the University of Florida Bureau of Economic and Business Research projected the County will increase by the fifth largest percentage increase (78 percent) of all Florida counties through 2040. The 2010 Census showed that population continued to grow in the County, despite the economic downturn that began in 2008.

Construction of the Preferred Alternative has the potential to adversely affect residential property values. This issue was examined by comparing the values of properties along the roadway to the values of property one and two lots away from the roadway. The roadways selected for the analysis were Prima Vista Boulevard, which also has a bridge crossing of the NFSLR, Airoso Boulevard, and the existing section of Crosstown Parkway. The detailed analysis is contained in the technical support document titled *Sociocultural Effects Report*. The results of the analysis suggest that taxable values for residential property one and two lots away from the project will not decline substantially as a result of the construction of the Preferred Alternative.

5.1.1.3 Land Use Impacts

A land use impact evaluation includes the potential for land use changes that could result from a transportation project. Compatibility with the City's adopted land use plans must also be considered. A land use evaluation also considers the impact of the project on the amount of open spaces and the general character of the existing landscape. Three distinct areas were considered regarding the potential for land use changes under any of the build alternatives. The first are the primarily residential areas west of the NFSLR. The second is the mixed residential/commercial/institutional land uses east of the NFSLR along the U.S. 1 corridor (mostly within the City). Impacts to these uses reflect the potential for changes to occur in land use patterns or intensification due to changes in accessibility and/or traffic volumes. The third area is the undeveloped lands immediately adjacent to the NFSLR [NFSLR Aquatic Preserve (AP) and the Savannas Preserve State Park (SPSP)]. Most of the vacant lands along the NFSLR are owned by the State of Florida and have been acquired for conservation purposes. Development of these lands is regulated by federal and state regulations as well as by City Code. These lands are discussed in detail in Section 6.0 (Section 4(f) Evaluation).

Residential areas west of the NFSLR are mostly developed, although vacant lots still exist. These lots are platted and are expected to be developed according to market demands and the City Comprehensive Plan. Few vacant parcels exist along the U.S. 1 corridor; approximately 6.5 percent are vacant on the west side of U.S. 1 and 5 percent on the east side. Of this vacant land, the majority is zoned residential low density in already platted and developed neighborhoods.

The No Build Alternative would have no effect on land use changes on the three areas being considered. It is anticipated that development of vacant parcels (outside the NFSLR floodplain area) would occur according to market demand and the City Comprehensive Plan. Similarly, redevelopment (or not) of existing parcels would proceed according to market demand and the City Comprehensive Plan. None of the build alternatives, including the Preferred Alternative, is anticipated to have an appreciable effect on land use changes within or surrounding the project area.

The *2035 Regional Long Range Transportation Plan* (2035 RLRTP) jointly adopted by the Martin Metropolitan Planning Organization and the St. Lucie Transportation Planning Organization in February 2011 shows some of the residential area east of U.S. 1 growing by 2,500-4,999 people by 2035. The residential area east of U.S. 1 is mostly located in the City's Planning Area 7 which was at 73.1% build out as of September, 2008. The residential area east of U.S. 1 is mostly located in the City's Planning Area 7, which was 73.1 percent built out as of September 2008. The area north of Spanish Lakes Golf Village is located in unincorporated St. Lucie County and is also mostly developed with some platted but vacant property between two developed neighborhoods. Build-out of these platted lots is expected to occur according to market demand.

Although vacant residential and non-residential lots are expected to be developed at some time in the future, any of the build alternatives, including the Preferred Alternative, could indirectly stimulate the development of vacant properties or could stimulate the redevelopment of already developed properties in the project vicinity. These stimulatory effects could result in the revitalization of the U.S. 1 corridor, consistent with planned development in the area, especially in the area of the Port St. Lucie City Center at the intersection of U.S. 1 and Walton Road.

For all build alternatives, including the Preferred Alternative, a wide area of green space with a shared-use pathway will be constructed on both sides of the parkway within the right of way that could be used by pedestrians and bicyclists providing a beneficial effect on the amount of open space lands within the City and County. However, all build alternatives, including the Preferred Alternative, could impact recreation and open space in the NFSLR. These impacts are discussed further in Section 6.0 (Section 4(f) Evaluation).

The Transportation Element of the City Comprehensive Plan includes a "New/Improved 6-Lane" facility on approximately the alignment of Alternative 1C. The adopted 2035 RLRTP includes a 6-lane facility on approximately the alignment of Alternative 1C. Thus, any of the build alternatives, including the Preferred Alternative, would be consistent with the intent of both the City Comprehensive Plan and the RLRTP. The Coastal High Hazard Area Policy 5.1.4.2 of the City Comprehensive Plan states that new roads or improvements in the coastal planning area should be completed to increase the number of traffic lanes for hurricane evacuation.

A Degree of Effect of "moderate" for land use impacts is assigned to the Preferred Alternative (and all build alternatives), due to the potential for increased population concentration and density within the Coastal High Hazard Area. However, the majority of the Coastal High Hazard Area served by the project is fully developed and the Preferred Alternative meets the intention of the policy. The Preferred Alternative is compatible with the local growth management policies and land use/transportation plans. Residential areas west of the NFSLR are mostly developed, although vacant lots still exist. It is anticipated that development of vacant platted residential and commercial parcels (outside the NFSLR floodplain area) will occur according to market demand and the City Comprehensive Plan. Similarly, redevelopment (or not) of existing parcels would proceed according to market demand and the City Comprehensive Plan. The Preferred Alternative will impact recreation and open space in the NFSLR [Section 6.0 (Section 4(f) Evaluation)]. Based on this evaluation, the Preferred Alternative will not have an appreciable effect on land use changes within or surrounding the project area.

5.1.1.4 Mobility

An evaluation of the impact of the project on mobility includes such factors as the effect of the project on public transportation facilities and connections, the effect on pedestrian mobility, presence of sidewalks, crosswalks, and pedestrian safe havens, and connectivity with intermodal[3] facilities. The evaluation also considers changes in traffic patterns that could affect access to neighborhoods, mobility of certain populations, and potential pedestrian/vehicular conflicts.

Under the No Build Alternative, streets providing neighborhood connectivity would remain in their current condition. The NFSLR and existing roadway system would continue to provide barriers to intermodal, pedestrian, and non-vehicular traffic between the areas west and east of the NFSLR.

[3] Intermodal refers to transportation by more than one means in a single trip, such as by bicycle and bus or by bicycle and walking.

All build alternatives, including the Preferred Alternative, would provide an additional crossing of the NFSLR, increasing regional intermodal connectivity between residential and non-residential areas for vehicles, transit buses, bicycles, and pedestrians. All build alternatives, including the Preferred Alternative, would provide signalized cross walks (but only at signalized intersections) to provide a means of maintaining access across the new roadway. Additionally, all build alternatives include shared-use pathways along both sides of the alignment abutting adjacent neighborhoods so that all build alternatives, including the Preferred Alternative, would improve access for the community, including the transportation disadvantaged. The extension of Crosstown Parkway to U.S. 1 would divert regional traffic from Port St. Lucie Boulevard and Prima Vista Boulevard, especially during congested peak travel times, and would divert local traffic from Airoso Boulevard and Floresta Boulevard. All build alternatives, including the Preferred Alternative, would improve traffic circulation and reduce traffic congestion on Port St. Lucie Boulevard and Prima Vista Boulevard by diverting regional traffic from these corridors, especially during congested peak travel times[4]. No major parking areas would be affected by any of the build alternatives.

As described in Section 4.1.1.1 (Existing Sociocultural Conditions), the Preferred Alternative area (and City) contains a relatively high percentage of elderly citizens, who currently or may in the near future need assistance accessing community services, businesses, and other community facilities within the study area. A relatively high percentage of persons categorized as disabled (as defined by the 2010 Census) are located within the project area and could benefit from improved regional access to U.S. 1 and the St. Lucie Medical Center and improved transit access within the corridor.

All build alternatives, including the Preferred Alternative, are developed with designated bicycle lanes and a green space with a shared-use pathway to accommodate bicyclists and pedestrians. This is an improved condition over the No Build condition where neither Prima Vista Boulevard nor Port St. Lucie Boulevard include bicycle accommodations (Prima Vista Boulevard includes a sidewalk along the south side of the roadway and Port St. Lucie Boulevard includes sidewalks along both sides of the roadway within the study area). However, all build alternatives, including the Preferred Alternative, would change local traffic patterns through the established communities in the study area, creating a number of cul-de-sacs, redirected roads, and restricted access [Section 5.1.1.1.2 (Community Cohesion) and Table 5.2].

The Degree of Effect on regional mobility is “enhanced” for all build alternatives, including the Preferred Alternative. However, on a local level, the Degree of Effect on local mobility is “moderate” for Alternatives 1C, 1F, and 6B for the same reasons discussed in Section 5.1.1.1.2 (Community Cohesion), due to the number of roadway modifications and disruptions of the local roadway network. The Degree of Effect on local mobility for Alternatives 2A, 2D, and 6A is “substantial” because of the partial isolation of the neighborhood east of Floresta Drive between West Virginia Drive and Walters Terrace (Alternative 2D) and the disruption to neighborhood street system by introducing cul-de-sacs, dead ends, and cutting off of east-west and north-south roads that provide connectivity within the study area (Alternatives 2A, 2D, and 6A). These roadway alterations could also have an impact on transit access from the neighborhoods by reduced pedestrian mobility within the neighborhood connecting to and across the Crosstown Parkway Extension (the only pedestrian crossing would be provided at Floresta Drive). These Degrees of Effect are different

[4] The traffic analysis generally concluded that the closer an alternative was located to an existing bridge crossing the more traffic it could divert from that route (but with less diversion from the other existing bridge crossing). Consequently, Alternative 1C, being more centrally located between the existing bridges, as compared to the other build alternatives, provided the most balanced ability to divert traffic off of the two existing routes.

than the ETDM Programming Screen ("enhanced") because the current analysis takes into consideration the disruption of local roads and traffic patterns, which are not specifically considered in the ETDM Programming Screen assessment of regional conditions.

The Preferred Alternative will provide an additional crossing of the NFSLR, increasing regional intermodal connectivity between residential and non-residential areas for vehicles, transit buses, bicycles, and pedestrians. It will provide signalized cross walks (but only at signalized intersections) to provide a means of maintaining access across the new roadway. However, the Preferred Alternative will change local traffic patterns through the established communities, creating a number of cul-de-sacs, redirected roads, and restricted access. In addition, the Preferred Alternative includes shared-use pathways and designated bicycle lanes along both sides of the alignment (designated bicycle lanes are not included on the bridge typical section) so it will improve access for the community, including the transportation disadvantaged. The extension of Crosstown Parkway to U.S. 1 will divert regional traffic from Port St. Lucie Boulevard and Prima Vista Boulevard, especially during congested peak travel times, and will divert local traffic from Airoso Boulevard and Floresta Boulevard. The Preferred Alternative will improve traffic circulation and reduce traffic congestion on Port St. Lucie Boulevard and Prima Vista Boulevard by diverting regional traffic from these corridors, especially during congested peak travel times[5].

5.1.1.5 Relocation

5.1.1.5.1 Residential Relocation and Displacement Impacts

An evaluation of the alternatives must include the number of residents and businesses that would need to be relocated or displaced as a result of the selection of a build alternative. These relocations are described in detail in the technical support document titled *Conceptual Stage Relocation Plan* (CSRP). The CSRP accomplishes three main goals. First, it assesses the number and type of relocations involved with each build alternative. The CSRP takes into account the land uses impacted by the alternatives, as well as the people who live there, and estimates who is being displaced and whether the relocation is residential or business-related. Second, it assesses the real estate market of the project area to determine its ability to supply replacement residential or commercial space to relocated parties. Third, it identifies any sources of additional assistance that may be available to relocated persons.

Through the ETDM Programming Screen, the TPO assigned a Degree of Effect of "substantial" for all build alternatives, except for Alternative 1C, which received a Degree of Effect of "moderate." This assessment of "substantial" was due to the number of relocations that would be required and the demand for services for assistance with relocations. Alternative 1C received a Degree of Effect of "moderate" because it has the lowest number of relocations. This section examines the various types of displacements based on the demographic characteristics of the project area. The results of this analysis are consistent with the ETDM Programming Screen.

Table 5.4 shows the total households by census tracts that would be displaced by each build alternative (based on the Year 2010 Census). Figure 4.3 in Section 4.0 (Affected Environment) shows the census

[5] The traffic analysis concluded that the closer an alternative was located to an existing bridge crossing the more traffic it could divert from that bridge (and with less diversion from the other existing bridge crossing). Consequently, Alternative 1C, which is located midway between the existing bridges, as compared to the other build alternatives, provides a balanced ability to divert traffic from the two existing bridges.

tracts within the project limits. Based on field observations, the total number of residential households to be displaced by the alternatives ranges from a low of 65 residences for Alternative 1C to a high of 141 residences for Alternative 2A. A number of properties were purchased by the City prior to the commencement of the NEPA process. As funds became available, the City began acquiring right of way associated with the Crosstown Parkway Extension based on the result of prior studies conducted in the early 1990s, and prior to the use of federal funds on this study. Once federal funds were applied on this study, right of way acquisition ceased within the limits of the project study area [Section 5.1.1.5.5 (Conceptual Stage Relocation Plan)]. These previously displaced households are reflected in Table 5.4. Prior purchases did not influence the selection of any alternative.

Table 5.4 Total Displaced Households by Build Alternative and Census Tracts

Build Alternative	Displaced Households by Census Tract			Total Displaced Households (Current)	Previously Displaced Households	Total Displaced Households
	Tract 20.01	Tract 20.02	Tract 20.03			
2A	2	1	138	141	4	145
2D	0	21	116	137	33	170
1C	0	36	29	65	35	100
1F	21	36	32	89	35	124
6B	21	62	17	100	34	134
6A	0	71	14	85	33	118

Based on a review of the U.S. Census tract information for the tracts in which the residential displacements would occur, the percentage of minority households to be displaced by the alternatives under consideration ranges from a low of 22.70 percent for Alternative 2A to a high of 36.47 percent for Alternative 6A. The overall percentage of minorities in the County is 36.10 percent, which is exceeded in Alternative 6A. Table 5.5 shows a summary of estimated minority household displacements by alternative.

Table 5.5 Summary of Anticipated Minority Household Displacements by Build Alternative

Build Alternative	Households by Census Tract			Minority Households by Census Tract			Estimated Total Minority Displacements		Total Displaced Households (Current)
	Tract 20.01	Tract 20.02	Tract 20.03	Tract 20.01	Tract 20.02	Tract 20.03	Households	Percentage	
2A	2	1	138	0	0	32	32	22.70%	141
2D	0	21	116	0	8	27	35	25.55%	137
1C	0	36	29	0	14	7	21	32.31%	65
1F	21	36	32	5	14	7	26	29.21%	89
6B	21	62	17	5	25	4	34	34.00%	100
6A	0	71	14	0	28	3	31	36.47%	85

Note: Based on census data, minority households include Black or African Americans, Native Americans and Alaskan Natives, and Hispanics.

Based on an analysis of the U.S. Census tract information for the tracts in which the residential displacements would occur, the estimated average income of households in the affected neighborhoods ranged from $45,625 to $55,800 per year (median family income for the County is $51,940 per year). Despite the median income level disparities on either side of the NFSLR, census data reveal that none of the build alternatives, considered in its entirety, disproportionately affects any income level group. Table 5.6 shows a summary of estimated income ranges by build alternative.

Table 5.6 Summary of Estimated Income Ranges by Build Alternative

Build Alternative	Households by Census Tract			Median Family Income by Census Tract			Estimated Income Range by Alternative		Total Displaced Households (Current)
	Tract 20.01	Tract 20.02	Tract 20.03	Tract 20.01	Tract 20.02	Tract 20.03	Low	High	
2A	2	1	138	$45,625	$53,500	$55,800	$45,625	$55,800	141
2D	0	21	116	$45,625	$53,500	$55,800	$45,625	$55,800	137
1C	0	36	29	$45,625	$53,500	$55,800	$ 45,625	$ 55,800	65
1F	21	36	32	$45,625	$53,500	$55,800	$45,625	$55,800	89
6B	21	62	17	$45,625	$53,500	$55,800	$45,625	$55,800	100
6A	0	71	14	$45,625	$53,500	$55,800	$45,625	$55,800	85

Based on a review of St. Lucie County Property Appraiser data and a windshield survey of the potentially impacted properties, the structures in the project area are predominantly residential homes built in the last 35 years. These homes were built during various waves of development activity as the population in the City grew in the 1980s and into the mid-1990s. Most of the structures in the project area were built between the late 1970s to the mid-1990s. A few houses in the area were built in the last few years during the most recent housing boom in the area that peaked in 2006.

Based on a review of the U.S. Census tract information for the tracts in which the residential displacements would occur, the percentage of elderly households (occupied by residents aged 65+ years) to be displaced by the alternatives under consideration ranges from a low of 14.12 percent for Alternative 6A, to a high of 18.00 percent for Alternative 6B. Table 5.7 is a summary of estimated elderly household displacements by build alternative.

Table 5.7 Summary of Estimated Elderly Household Displacements by Build Alternative

Build Alternative	Households by Census Tract			Elderly Households by Census Tract			Estimated Total Elderly Displacements		Total Displaced Households (Current)
	Tract 20.01	Tract 20.02	Tract 20.03	Tract 20.01	Tract 20.02	Tract 20.03	Households	Percentage	
2A	2	1	138	1	0	22	23	16.31%	141
2D	0	21	116	0	3	19	22	16.06%	137
1C	0	36	29	0	5	5	10	15.38%	65
1F	21	36	32	6	5	5	16	17.98%	89
6B	21	62	17	6	9	3	18	18.00%	100
6A	0	71	14	0	10	2	12	14.12%	85

Based on a review of the U.S. Census tract information for the tracts in which the residential displacements would occur, the average size of the households to be displaced by the alternatives under consideration ranges from a low of 2.51 for Alternative 6B to a high of 2.65 for Alternative 2A. Based on census data and field observations, household size in the study area is not expected to exceed five family members. Households with more than five family members tend to have household incomes less than the median level for the County. Table 5.8 is a summary of the average size of households by alternative.

Table 5.8 Summary of Estimated Average Household Size by Build Alternative

Build Alternative	Households by Census Tract			Average Household Size Census Tract			Estimated Average Household Size		Total Displaced Households (Current)
	Tract 20.01	Tract 20.02	Tract 20.03	Tract 20.01	Tract 20.02	Tract 20.03	By Household	Percentage Greater than 5 Members	
2A	2	1	138	2.21	2.58	2.65	2.65	0.00%	141
2D	0	21	116	2.21	2.58	2.65	2.64	0.00%	137
1C	0	36	29	2.21	2.58	2.65	2.62	0.00%	65
1F	21	36	32	2.21	2.58	2.65	2.52	0.00%	89
6B	21	62	17	2.21	2.58	2.65	2.51	0.00%	100
6A	0	71	14	2.21	2.58	2.65	2.59	0.00%	85

Based on a review of the U.S. Census tract information for the tracts in which the residential displacements would occur, the percentage of households with disabled occupants to be displaced by the alternatives under consideration ranges from a low of 22.70 percent for Alternative 2A to a high of 29.0 percent for Alternative 6B. The overall percentage of disabled persons in the County is 14.00 percent, which is exceeded by all alternative scenarios, including the Preferred Alternative. Table 5.9 is a summary of estimated disabled displacements by build alternative.

Table 5.9 Summary of Estimated Disabled Displacements by Build Alternative

Build Alternative	Households by Census Tract			Disabled Households by Census Tract			Estimated Total Disabled Displacements		Total Displaced Households (Current)
	Tract 20.01	Tract 20.02	Tract 20.03	Tract 20.01	Tract 20.02	Tract 20.03	Households	Percentage	
2A	2	1	138	1	0	31	32	22.70%	141
2D	0	21	116	0	6	26	32	23.36%	137
1C	0	36	29	0	11	6	17	26.15%	65
1F	21	36	32	6	11	7	24	26.97%	89
6B	21	62	17	6	19	4	29	29.00%	100
6A	0	71	14	0	21	3	24	28.24%	85

Based on a review of the U.S. Census tract information for the tracts in which the residential displacements would occur, the average percentage of tenant-occupied residences of the households to be displaced by the alternatives under consideration ranges from a low of 10.77 percent for Alternative 1C to a high of 15.74 percent for Alternative 1F. Based on field observations, some mobile homes located within La Buona Vita mobile home park in Census Tract 20.01, were shuttered with no vehicles in the driveway, thus suggesting that the residences were seasonally occupied. More specifically, eight of the 21 displaced units shown in Table 5.10 for census tract 20.01 were either listed for sale or shuttered. Table 5.10 is a summary of the average estimated percentage of tenant-occupied residences displaced by build alternative.

Table 5.10 Summary of Estimated Tenant-Occupied Displacements by Build Alternative

Build Alternative	Households by Census Tract			Tenant Occupied Households by Census Tract			Estimated Total Tenant Occupied Displacements		Total Displaced Households (Current)
	Tract 20.01	Tract 20.02	Tract 20.03	Tract 20.01	Tract 20.02	Tract 20.03	Households	Percentage	
2A	2	1	138	0	0	19	19	13.48%	141
2D	0	21	116	0	3	16	19	13.87%	137
1C	0	36	29	0	5	4	9	13.85%	65
1F	21	36	32	5	5	4	14	15.73%	89
6B	21	62	17	5	8	2	15	15.00%	100
6A	0	71	14	0	10	2	12	14.12%	85

5.1.1.5.2 Environmental Justice

The U.S. Department of Housing and Urban Development (HUD) defines a low-income household as a household where the annual income does not exceed 80 percent of the area's median income and defines the threshold for identifying low/moderate income areas as a block group where more than 50 percent of the households in that area have low/moderate incomes. The City obtained an exception to the 50 percent threshold such that low/moderate income areas within the City are block groups where 45.2 percent (or more) of the households are low income households. The Villas of Village Green is the only low/moderate income area within the sociocultural effects study area [Section 4.1.1.1 (Existing Sociocultural Conditions)]. It is located west of U.S. 1 and southeast of Veterans Memorial Parkway and is at the 45.2 percent threshold. Alternatives 2A and 2D pass north of the Villas of Village Green and tie into the existing alignment of Veterans Memorial Parkway. No residential acquisitions would be required in this neighborhood by either alternative, and access would not be affected by either alternative. As discussed in Section 5.1.1.5.1 (Residential and Relocation Displacement Impacts) and as shown in Table 5.6, because of the homogenous make-up of the study area, none of the build alternatives, including the Preferred Alternative disproportionately affect any income level group including Low-Income Populations.

As discussed in Section 5.1.1.5.1 (Residential and Relocation Displacement Impacts) and as shown in Table 5.5, data collected for this project indicate the percentage of minority households to be displaced by the build alternatives ranges from a low of 22.70 percent for Alternative 2A to a high of 36.47 percent for Alternative 6A. The overall percentage of minorities in the County is 36.1 percent, which is exceeded by Alternative 6A. The Preferred Alternative does not pass through this area and thus, will not have a disproportionate impact on minorities. During the course of the project, no ethnic or minority organizations were identified within the project study area and no ethnic or minority organizations presented themselves as having particular concerns about the project. Based on the numbers and types of households that would be affected by each of the build alternatives, only Alternative 6A has the potential for affecting neighborhoods with a higher than average number of minority households. The Preferred Alternative will not disproportionately affect minority or low-income households. Thus, the Degree of Effect for environmental justice is "None" for all build alternatives except for Alternative 6A, which receives a Degree of Effect of "Minimal."

In August 2000, Executive Order 13166 was issued: *Improving Access to Service for Persons with Limited English Proficiency* (LEP), to ensure that people with limited English proficiency can meaningfully access programs and activities of agencies receiving federal financial assistance. In December 2005, the USDOT published Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Person to provide guidance for all USDOT funding recipients in meeting the intent of Executive Order 13166. The FDOT has determined that if demographic data indicate that 5 percent or 1,000 persons or more in a project area speak a language other than English, then LEP accommodations are required. Since census data indicates that the Hispanic population in the project area exceeds 5 percent, LEP accommodations were employed for this project. Multilingual staff members were present during all public involvement activities, including the Public Hearing. The Public Hearing also provided accommodations for translations of brochures, meeting invitations, and media notices. The home page for the project web site includes contact information for Creole and Spanish speaking people where they can obtain project information.

5.1.1.5.3 Business Relocation and Displacement Impacts

All but Alternatives 2D and 1C have the potential to displace existing businesses (Table 5.11). As noted in Table 5.11, Alternative 2A could displace one business. Alternative 6A could displace as many as twelve existing businesses. Most of these businesses are located in a small shopping center just north of Alternative 6A connection with U.S. 1. Alternatives 1F and 6B have the potential to displace 12 existing businesses that are located in a shopping center on U.S. 1. Through the ETDM Programming Screen, the TPO identified the potential to displace businesses for Alternatives 1F, 6B, and 6A but assigned a Degree of Effect of "substantial" for "relocation" for all build alternatives except for Alternative 1C, which received a Degree of Effect of "moderate." For this evaluation, a Degree of Effect of "moderate" was assigned to Alternatives 1F, 6B, and 6A for the potential to displace the 12 businesses listed in Table 5.11. A Degree of Effect of "minimal" was assigned to Alternative 2A for the potential to displace one business. Alternatives 2D and 1C (Preferred Alternative) were assigned a Degree of Effect of "none" because they would not displace any businesses (Table 5.1).

Table 5.11 Potential Businesses to be Displaced

Alternative	Business	Tenant
2A	Day School	Lizzie's House Inc.
2D	None	None
1C	None	None
6A	Retail Store	Pretty Pets
	Retail Store	Atlantic Golf Carts
	Community Office	American Legion Post 318
	Retail Store	Coastal Floors
	Restaurant	Nemo's New England Seafood Restaurant
	Real Estate Office	B&B Realty
	Retail Store	Pierce This, Inc.
	Lounge/Bar	Tropical Martini
	Barber Shop	Charles' Barber Shop
	Office	Hubbard Construction
	Vacant	
	Vacant	
1F and 6B	Insurance Agency	Port St. Lucie Insurance Agency
	Hair Salon	Karisma Hair & Nail Salon, Inc.
	Retail Store	B&B Jewelry & Pawn
	Real Estate Office	Friend Realty, Inc.
	Restaurant	Europa Pizza and Pasta
	Tax Office	Liberty Income Tax Services
	Laundry Mat	Leisure Time Laundry & Dry
	Travel Agency	Travel Hub
	Retail Store	Another Man's Treasures
	Retail Store	Carpets, Etc.
	Retail Store	Artistic Inspirations
	Retail Store	Natures Den

The Preferred Alternative will result in 65 occupied residential property relocations (many vacant parcels are located along this alignment). If the number of previously purchased developed properties is included (35), a total of 100 residential properties will be affected by this alternative. Of the 65 occupied residential properties to be acquired, it is estimated, based on census data, that 21 minority households (32.31 percent of the total), 17 disabled households (26.15 percent of the total), and 10 elderly households (15.38 percent of the total) will need to be relocated. No minority or low-income populations have been identified that would be adversely impacted by the Preferred Alternative. Therefore, in accordance with the provisions of EO 12898 and FHWA Order 6640.23, no further Environmental Justice analysis is required.

A detailed remediation plan has been completed to address all the noncompliance issues associated with the parcels along the Preferred Alternative that were acquired after the November 2000 federalization date. The remediation plan documents the actions taken to bring each parcel into compliance with the appraisal, acquisition, and relocation assistance requirements of the Uniform Act, and is included as a technical support document (*Right of Way Remediation Plan - Implementation; Crosstown Parkway Extension*) to the EIS.

5.1.1.5.4 Public Facilities and Services

A number of community facilities and services (e.g., schools and churches) are located throughout the project area. Most of these are located in the eastern portion of the County [Section 4.1.1.1 (Existing Sociocultural Conditions)]. However, because the project area is primarily residential west of the NFSLR and mixed residential and commercial east of the NFSLR, these types of resources are limited within the immediate project area. None of the build alternatives, including the Preferred Alternative, would directly affect these facilities. Access to community facilities would remain unchanged under the No Build Alternative. All build alternatives, including the Preferred Alternative, would result in an alteration of north-south and east-west connectivity to community activity centers across the project corridor, especially for pedestrians and bicyclists; however, it would also enhance east-west connectivity to community activity centers across the NFSLR. Crosswalks would provide pedestrians and bicyclists safe access across the Crosstown Parkway corridor to community facilities. Thus, the Degree of Effect for public facilities and services is "none" for all build alternatives, including the Preferred Alternative (Table 5.1).

Although none of the build alternatives would affect any public facilities and services, they could affect one or more public parks. The Kiwanis Park is a neighborhood park located within the project area. Access to the Park is by a driveway entrance on the southern side of the Park (Breakwater Avenue). It can also be accessed by foot or bicycle from the surrounding streets. The No Build Alternative would have no impacts on Kiwanis Park. Of the build alternatives, only Alternative 2D would impact Kiwanis Park. The U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), National Marine Fisheries Services (NMFS), and Florida Department of Environmental Protection (FDEP) stated their objections to the use of the AP and SPSP for all build alternatives, except Alternative 6A. All three of these pubic properties have been determined to be Section 4(f) resources [Section 6.0 (Section 4(f) Evaluation)]. The evaluation of impacts to these public properties is contained in Section 6.0 (Section 4(f) Evaluation). Coordination with these agencies regarding the Section 4(f) properties is described in Section 7.3.4 [Natural Habitats (Wetlands, Wildlife Habitat, and Essential Fish Habitat)].

The Preferred Alternative will not directly affect any community facilities and services (e.g., schools and churches). It will affect north-south connectivity to community activity centers, especially for pedestrians and bicyclists. Crosswalks and signalized intersection will be provided to provide safe access across the Crosstown Parkway corridor. The Preferred Alternative will increase access to facilities across the NFSLR. Kiwanis Park will not be affected by the Preferred Alternative, although the AP and the SPSP (Section 4(f) properties) will be affected. Impacts to these properties are discussed in Section 6.4 (Use of Section 4(f) Properties).

5.1.1.5.5 Conceptual Stage Relocation Plan

Right of way acquisition can require the partial or complete purchase of residential or business properties, resulting in the displacement of the property owners or their tenants. An evaluation of relocation and displacement impacts examines the effects of relocating residents or businesses from an existing location and reestablishing them in a new place. This action has the potential to modify the complex spatial relationships between residents, businesses, and community facilities, and can involve financial as well as social/psychological considerations. Under the requirements of federal law and state statutes, before

acquiring right of way, all properties are appraised on the basis of comparable sales and land use values in the area. Owners of property to be acquired will be paid fair market value for their property rights. In addition, property owners will be given assistance in finding replacement business sites and dwellings. Details of the residential and business relocations required for the build alternatives are provided in the technical support document titled *Conceptual State Relocation Plan* and are summarized in this section.

To minimize the unavoidable effects of right of way acquisition and displacement of people, the FDOT will carry out a right of way and relocation program in accordance with Section 339.09 Florida Statutes (FS) and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646 as amended by Public Law 100-17; Uniform Act). The FDOT provides advance notification of impending right of way acquisition. No person lawfully occupying real property will be required to vacate without at least 90 days written notice of the intended vacation date and no occupant of a residential property will be required to move until decent, safe, and sanitary replacement housing is made available. "Made available" means that the affected person has either by himself obtained and has the right of possession of replacement housing, or that the FDOT has offered the household decent, safe, and sanitary housing, which is within his financial means and available for immediate occupancy. Relocation specialists are assigned to carry out the relocation assistance and payments program.

The No Build Alternative would not involve the relocation of any residents or businesses. The build alternatives would affect differing numbers and types of households, as quantified in the previous section. The potentially displaced single-family homes have similar characteristics. The houses are predominantly 15 to 25 years old, with three bedrooms and two bathrooms; although some of the single-family homes in the area have two bedrooms and one bathroom. The *Conceptual Stage Relocation Plan* conducted in association with this study in October 2010 identified that the majority of the potentially displaced homes are on quarter-acre lots, with some homes occupying double lots. Currently the average home price in the City is approximately $99,000 and the average rental price was $1,051 per month.

The City acquired approximately 70 properties along the Crosstown Parkway corridor between 1997 and 2010. Forty-nine parcels were acquired subsequent to November 2000, which is the established federalization date of the project. Federal regulations (e.g., the Uniform Act) were not followed when the City acquired the properties (with the exception of one federally-authorized hardship acquisition, for which the City used a prequalified right of way consultant). The FDOT completed (August 2012) remediation for those properties (31 residentially improved lots and 18 vacant residential lots) within the Preferred Alternative alignment to bring them into compliance with the Uniform Act. The remediation plan is documented in the technical support document titled *Right of Way Remediation Plan – Implementation; Crosstown Parkway Extension*.

Research conducted on Zillow™, Trulia.com, and Areavibes.com on August 1, 2012, showed a sufficient housing supply is available for the number of residents to be relocated under the Preferred Alternative. As of that date, the Port St. Lucie Metropolitan Area had a supply of over 4,626 single-family homes for sale and 424 properties for rent. In the 34983 zip code, where all of the residential relocations for the Preferred Alternative and nearly all of the residential relocations associated with other alternatives occur, 618 listings had two or more bedrooms and one or more bathrooms, and they ranged in price from $41,000 to $520,000. According to sales activity in the 34983 zip code at that time, the median home price in the relocation area was approximately $101,700. Additional real estate market statistics and other information,

including a sample of listed comparable homes and their locations relative to the six build alternatives are contained in the technical support document titled *Conceptual Stage Relocation Plan*. On August 1, 2012, a similar search for available homes in the 34983 zip code was conducted using Zillow™, based on the same criteria. That search resulted in a listing of 276 homes. Based on the analyses conducted, a sufficient comparable housing supply exists for potential relocations associated with any build alternative, including the Preferred Alternative (Alternative 2A has the maximum number of potential relocations at 141).

The potential relocation of business varies depending on the build alternative under consideration. All build alternatives would affect publicly-owned lands in the NFSLR and Alternative 2D would result in numerous community impacts along Floresta Drive. However, no impacts to any public facilities or institutional facilities are anticipated under any build alternative [state-owned land impacts are discussed in Section 6.0 (Section 4(f) Evaluation)]. None of the potentially displaced non-residential uses have any unique or special characteristics that could not be reestablished elsewhere in the community.

It is estimated that sufficient commercial space exists to meet the needs of any businesses that could be displaced by the build alternatives. A search of locally-advertised commercial and retail properties available in the Port St. Lucie market in 2009 produced available commercial space within the same zip code. These were located in the St. Lucie East Business Park, located at 8280 Business Park Drive, and Sunrise Plaza, nearing completion at 8958 South U.S. 1. These sites are within a short distance of the existing business locations. In 2008 and 2009, windshield surveys of the surrounding commercial properties adjacent to U.S. 1 suggested a surplus inventory of comparable available retail locations. This information has not been updated because no business relocations will be required for the Preferred Alternative.

Despite the potential business relocations, it is anticipated that any of the build alternatives, including the Preferred Alternative, would enhance access to remaining businesses in the area. Currently east-west access to businesses along U.S. 1 is primarily via Port St. Lucie Boulevard and Prima Vista Boulevard. Any of the build alternatives would reduce congestion on these facilities by diverting regional traffic and local traffic from those corridors. Simultaneously, this project would also divert local traffic from portions of Airoso Boulevard and Floresta Drive, and improve access to U.S. 1 and its traffic-based business areas between Port St. Lucie Boulevard and Prima Vista Boulevard. Also, the additional crossing of the NFSLR would increase access to businesses and other community resources for the disabled and other special needs patrons to access the businesses and other community resources along U.S. 1. In addition, the improvements would increase business visibility for traffic-based businesses along U.S. 1 between Port St. Lucie Boulevard and Prima Vista Boulevard. The change in travel patterns caused by a build alternative is anticipated to result in diversion of traffic from competing corridors of Port St. Lucie Boulevard and Prima Vista Boulevard. However, as noted in the traffic analysis conducted for the project, a significant amount of traffic is expected to remain on the existing roadway system. Businesses along these roadways that rely on pass-by traffic for their livelihood should have a significant amount of patronage to draw upon even with the anticipated changes in traffic flows. Construction of any of the build alternatives could affect local businesses due to temporary detours of traffic and disruption of traffic flow. These impacts could lead to lost business revenue. However, the number of businesses impacted would be relatively small. Standard FDOT procedures would be used to maintain access to businesses to mitigate negative impacts of the project's construction phase.

Three local agencies were contacted and interviewed, including the Economic Development Council of St. Lucie County, the St. Lucie County Chamber of Commerce, and St. Lucie County's Economic and Strategic Development Department. Each agency discussed the types of services available to area businesses, as well as how businesses would obtain these services. These interviews were supplemented with information available on each agency's website where applicable. All three agencies mentioned working closely with the other two agencies to meet the needs of area businesses.

5.1.2 Railroads and Utilities

5.1.2.1 Railroads

There are no railroads located within the project area. Thus, the Preferred Alternative will not have any direct or indirect impacts on railroad infrastructure or railroad facilities.

5.1.2.2 Utilities

Under the No Build Alternative, no changes would be made to the existing roadway system, no bridge would be constructed, and this alternative would have no direct or indirect impacts on the existing utility infrastructure within the project area. Each of the build alternatives including the Preferred Alternative would have some effect on the various utilities present in the project area, either as buried or above-ground utilities. Table 5.12 provides an estimate of the costs associated with the probable relocations of existing utilities that would be affected by the construction of each alternative. Costs vary due to the level of relocations required along existing roadways, especially along U.S. 1. The Preferred Alternative will have an estimated utility relocation cost of $4.7 million. Details of the impacts to utility infrastructure are contained in the technical support document titled *Utility Assessment Package*.

Table 5.12 Estimated Costs for Relocation of Utility Infrastructure for Each Build Alternative

Alternative	Estimated Relocation Cost (millions)
2A	$ 6.0
2D	$ 6.8
1C (Preferred Alternative)	$ 4.7
1F	$ 5.9
6B	$ 5.5
6A	$ 5.3

5.2 Cultural and Historical Resources

5.2.1 Archaeological and Historical

A Cultural Resource Assessment, conducted in accordance with the procedures contained in 36 CFR Part 800 and including background research and a field survey coordinated with SHPO, was performed for the project alternatives and the Preferred Alternative pond sites. No archaeological or historical sites or properties were identified, nor are any expected to be encountered during subsequent project development. The FHWA, after consultation with the SHPO, has determined that no resources listed or eligible for listing on the National Register would be impacted. The SHPO coordination letters are contained in Appendix A.

5.2.2 Recreation and Parkland

A number of public parks and other recreation areas are located in the project area. They are listed in Section 4.2.2 (Recreation and Parkland). Of these, the AP, SPSP, and Kiwanis Park could be affected by the build alternatives. The No Build Alternative would have no effect on any these recreation and park resources. The Preferred Alternative will impact the AP and the SPSP, but not Kiwanis Park. The impacts on the SP and the SPSP are discussed in detail in Section 6.0 (Section 4(f) Evaluation). The other 14 recreation and park areas within the project area would not be affected by any of the build alternatives, including the Preferred Alternative.

5.3 Natural and Physical Resources

5.3.1 Pedestrian / Bicycle Facilities

The No Build Alternative would not impact pedestrian and bicycle facilities. However, the No Build Alternative would not provide enhancements to the current pedestrian and bicycle facilities. Connectivity across the NFSLR would remain at Port St. Lucie Boulevard and Prima Vista Boulevard. Designated bicycle lanes would exist only on the section of Crosstown Parkway that ends at Manth Lane. Sidewalks would remain as discontinuous segments throughout the project area.

All build alternatives, including the Preferred Alternative, will enhance multimodal opportunities within the City for pedestrians, bicyclists, and other non-vehicular traffic. In all typical sections, including those of the Preferred Alternative, the limited access design will limit vehicular/bicycle conflicts due to the elimination of driveway openings. All build alternatives, including the Preferred Alternative, include accommodations for pedestrians and bicyclists. The suburban typical section west of Manth Lane will include a wide area of green space with 8-foot meandering sidewalks along both sides of the roadway. The green space will include berms to aid in buffering the adjacent residential areas from the roadway. Bicycles will be accommodated by a 5-foot designated bicycle lane within the outside shoulder on both sides of the roadway. The urban typical section between the bridge and U.S. 1 will accommodate pedestrians with 8-foot sidewalks on both sides of the roadway and bicycles will be accommodated with a 5-foot designated bicycle lane adjacent to the outside travel lanes along both sides of the roadway. For the bridge typical section, pedestrian facilities were originally developed to include 8-foot sidewalks on both sides of the roadway and bicycle accommodations within a 10-foot shoulder. After selection of the Preferred Alternative, coordination continued with NMFS, USFWS, and USACE regarding project impacts and mitigation [Section 8.6.3 (Agency Coordination and Concurrences after Public Hearing)]. Through this coordination effort, the bridge typical section was reduced to 103 feet. The reduced typical section will accommodate pedestrians with a 6-foot sidewalk and a 5-foot bicycle lane/paved shoulder on each side of the roadway. The bicycle lane/paved shoulder and sidewalk will be separated by a traffic barrier between them.

All build alternatives, including the Preferred Alternative, will connect with existing pedestrian and bicycle facilities outside of the project area and will increase pedestrian and non-vehicular traffic and connectivity, while the No Build Alternative would maintain current conditions. The City has determined that the proposed bicycle and pedestrian provisions are consistent with the direction and intent of the City Comprehensive Plan and the Land Development Regulations (Appendix A). The Preferred Alternative is

consistent with Title 23 United States Code (USC), Section 109(n) and meets the design standards of the FDOT *Bicycle Facilities Planning and Design Handbook* and American Association of State Highway and Transportation Officials (AASHTO) Standards. The maintenance of bicycle traffic during construction is addressed in Section 5.3.19 (Construction).

5.3.2 Visual and Aesthetic

A new bridge, its approaches, and a widened/new roadway will present a new element in the visual landscape. Other components of the project (e.g., stormwater ponds and landscaping) will also result in visual changes. At the design year, it is estimated that, each day, over 60,000 people will drive through the new corridor. This section considers: (1) views from the road and bridge, and (2) views from adjacent lands of the roadway and bridge.

5.3.2.1 Views from the Roadway and Bridge

West of the NFSLR, the views from the existing roadway system are of a predominately single-family residential setting with a few public/institutional land uses and a few vacant lots (Photo 5.4). The views by users of the NFSLR and its tributaries are currently of a generally undeveloped river bordered by natural vegetation. On the east side of the NFSLR, existing views are of higher-density single-family and multi-family residences, with primarily commercial and retail businesses along U.S. 1. Because of the essentially flat topography, existing views are limited to the immediate viewing area.

Photo 5.4. Typical view of a residential street on the west side of the NFSLR

Under the No Build Alternative, no changes would be made to the existing roadway system and no bridge would be constructed. The natural lands that are part of the SPSP would remain undeveloped. Floodplain lands that are outside of the SPSP would also likely remain undeveloped (as stipulated by City code and federal and state regulations). In some places, this alternative could negatively affect the visual landscape because, as predicted by the traffic model, the views would be of a more congested roadway system than currently exists.

The rest of this page is intentionally left blank

Photo 5.5. Typical view from the road on the west side of the NFSLR under any of the build alternatives, including the Preferred Alternative

Under the six build alternatives, including the Preferred Alternative, the view from the road and bridge would be of a widened roadway section. On the west side of the NFSLR, views by drivers on the new roadway will be similar to those seen along the completed portion of the Crosstown Parkway (Photo 5.5). The views will be of a 6-lane parkway with green space. The green space will contain a shared-use pathway with meandering pedestrian sidewalks and landscaped berms on both sides of the roadway. The residences will be partially screened in the background by the landscaped berms. If noise barriers are determined to be necessary during detailed design and approved by the public, the noise barriers will be constructed at the top of the landscaped berms, further screening the views of the residences.

As the roadway crosses the NFSLR, the views from the roadway will consist of a 6-lane bridge. The distant view from the bridge will be of the natural environment of the floodplain, similar to the views seen from the bridges at Port St. Lucie Boulevard and Prima Vista Boulevard.

The bridge design is expected to use the rule of "form following function" to provide an efficient, durable, and aesthetically pleasing structure. Continuity of line, proportion, simplicity, and attention to details that promote constructability and integration of the structure into the surroundings will be part of the detailed design. Bridge aesthetic treatments being considered will include concrete color, surface finishes, decorative street lighting, and decorative pedestrian handrails that would allow views of the natural setting.

East of the NFSLR in the urban typical section, views of the roadway for all build alternatives, including the Preferred Alternative, will consist of a 6-lane roadway with sidewalks on both sides of the road. Landscaping within the right of way will be included where space and safety allows. No berms are included on the east side of the NFSLR. Views of the intersection with U.S. 1 will be similar to existing major intersections along U.S. 1.

5.3.2.2 Views from Adjacent Lands of the Roadway and Bridge

West of the NFSLR, views of the parkway from adjacent residences will be somewhat shielded from the proposed landscaped berms at the outside edge of the right of way. If, during the design phase, it is determined that noise barriers will be constructed for the Preferred Alternative, views toward the roadway from the affected residential areas will be of a constructed noise barrier [Section 5.3.4.5 (Noise Barrier Analysis)]. As the roadway becomes elevated at the bridge approaches along and near Coral Reef Street, residents would view a vertical retaining wall under Alternatives IC, 1F, and 6B. The approaches for the other build alternatives would begin beyond the residential streets.

From the NFSLR, views of a built bridge would be similar under all build alternatives, including the Preferred Alternative. The view of the bridge would be similar to the view of the existing bridges at Port St. Lucie Boulevard and Prima Vista Boulevard (Photo 5.6). Given the generally low profile of the bridge and meandering course of the NFSLR within the project area, the bridge would not be visible from a long distance. The visual setting close to the bridge will be altered substantially, changing from a river view with minimal to no man-made features to a view of a structure spanning the NFSLR. However, with the exception of the exposed channel spans, most of the relatively low elevation bridge and its approaches will be concealed by the tree canopy adjacent to the bridge.

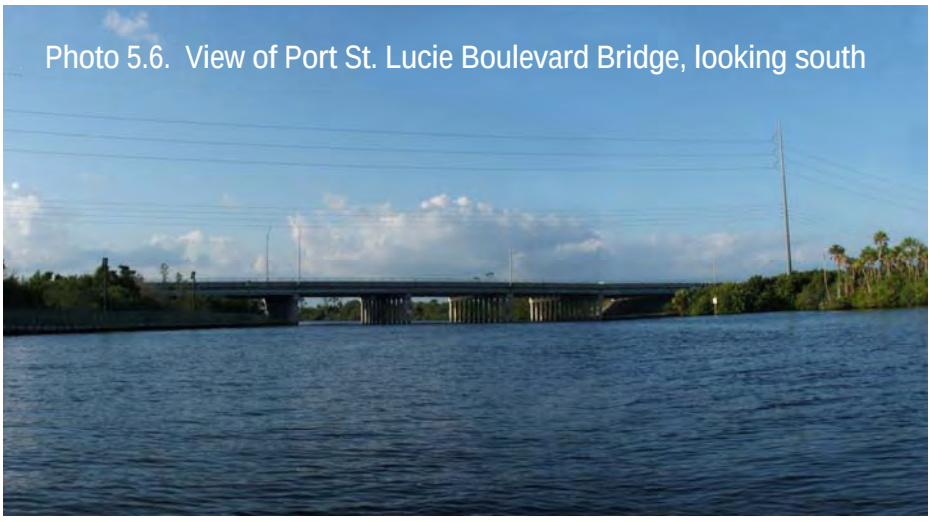


Photo 5.6. View of Port St. Lucie Boulevard Bridge, looking south

Additional traffic-generated noise could also affect visitors' use of the AP and SPSP. The noise effects are discussed in Section 5.3.4.4 (Predicted Noise Level Analysis) and 5.3.14.5.2 [Noise Impacts (Wildlife and Habitat)].

East of the NFSLR, under all alternatives except the Preferred Alternative, the roadway passes near residential areas. Under these alternatives, residents would have views of the elevated roadway approaches. Under Alternatives 1F and 6B, for residents of La Buona Vita, especially those closest to the new roadway, views of the new roadway and the elevated approaches would be in their immediate foreground. Under Alternative 6A, La Buona Vita residents would have a somewhat shielded view because they are separated from the roadway. Some residents along Buckingham Terrace and Oakmont Lane (in the subdivision north of the alignments of Alternatives 2A and 2D) would have an altered visual landscape, changed from a natural forested setting to views of bridge transitioning to an elevated roadway section and the stormwater ponds. Views by the residents south and east of Veterans Memorial Parkway would be incrementally changed from the divided 4-lane parkway to the 6-lane urban cross section.

For the reasons outlined for each build alternative, the Degree of Effect for aesthetics is "moderate" for Alternatives 1F and 6B, "minimal" for Alternatives 2A, 2D, 1C, and 6A (Table 5.1). Note that in Table 5.1, Alternative 6A has a Degree of Effect of "substantial" because noise impacts are included in the analysis of aesthetics [Section 5.3.4.5 (Noise Barrier Analysis)].

5.3.2.3 Visual and Aesthetic (Preferred Alternative)

The Preferred Alternative will add a new visual element in the visual landscape. Existing residences along the Preferred Alternative will be acquired west of the NFSLR but no residences or businesses are located at the eastern terminus. A low-level bridge that meets the minimum-required bridge height (per USCG

clearance requirements) will minimize visual impacts of the bridge structure. Mechanically Stabilized Earth (MSE) walls are part of the bridge design. Specific aesthetic treatments for noise walls (if required[6]) and vertical retaining walls, such as color and decorative surface finishes, are design features and will be determined during detailed design.

The Preferred Alternative requires consideration of all practicable measures to avoid and minimize impacts to the natural habitats associated with the AP and the SPSP. Specialized lighting fixtures will be used to direct light onto the pavement (rather than lighting mounted on poles) to reduce light trespass into natural habitats and surrounding areas to the maximum extent practicable.

As a result of the effort to reduce the physical impacts to the AP and the SPSP, visual impacts of the bridge were also addressed. For example, the depth of the bridge deck has been balanced with the need to reduce the number of piers required. The distance between the piers is dictated by the required horizontal distance. These balanced proportions are also visually pleasing.

A Citizen's Discussion Group included a discussion of design elements to be incorporated into the typical section for the Crosstown Parkway (from I-95 to U.S. 1) such as berms, pedestrian accommodations, and neighborhood cul-de-sacs.[7] During the design phase, the City will elicit input from the community at one or more City Council meetings regarding the lighting and visual aspects of the bridge and landscaping for the project. Visual treatments for the bridge design, such as concrete cap shapes, color, surface finishes, or decorative features (e.g., lighting or decorative ironwork) will be finalized or selected during detailed design and after consideration of public input. Public coordination for aesthetic aspects is a project commitment [Section 9.0 (Commitments and Recommendations)].

5.3.3 Air Quality

As discussed in Section 4.3.3 (Air Quality), the carbon monoxide (CO) screening analysis was modeled for the 1-hour and 8-hour CO concentrations for both the opening year in 2017 and the design year in 2037. This screening is conducted to determine if the project would have air quality impacts. The typical section west of the bridge includes a 330-foot right of way. The right of way line is over 110 feet from the nearest travel lane. While 8-foot sidewalks will be constructed on both sides of the road, they are not considered sites of extended human exposure. Therefore, the screening model's default receptor distances at intersections were used to estimate the highest 1-hour and 8-hour CO concentrations. The intersection geometries for all alternatives are provided in the technical support document titled, *Air Quality Report*. The results of the CO screening analysis are reported as peak traffic volumes at the approaches to intersections.

The results of the CO screening test for the 1-hour and 8-hour CO concentrations are provided in Table 5.13 for both the opening year in 2017 and the design year in 2037. The CO for the 2037 screening analysis showed that the highest CO concentrations at the worst intersection are 9.1 parts per million (ppm) for the 1-hour test and 5.5 ppm for the 8-hour test. These worst-case CO concentrations are below the National Ambient Air Quality Standards (NAAQS) thresholds of 35 ppm for the 1-hour tests and 9.0 ppm for the 8-hour tests. Therefore, the project will not cause the air quality to exceed NAAQS. Additional details of the air quality

[6] The decision to construct noise walls will be made during the final design phase (see Section 5.3.4.6 - Noise (Preferred Alternative).

[7] Citizens Discussion Group held on January 22, 2004 (Appendix I).

Table 5.13 CO Screening Test Analysis for 2017 and 2037 Using CO Florida 2012

	Speed (mph)		Number Of Lanes		2017 CO (ppm)		2037 CO (ppm)		NAAQS Exceeded?[8]	
Intersection	CTP	OTHER	CTP	OTHER	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
CTP / Bayshore Boulevard	45	40	6LD	4LD	8.2	4.9	8.1	4.9	No	No
CTP / Airoso Boulevard	45	40	6LD	4LD	7.5	4.5	7.4	4.4	No	No
CTP / Sandia Drive	45	35	6LD	2L	6.9	4.1	6.7	4.0	No	No
CTP / Floresta Drive	45	40	6LD	4LD	8.4	5.0	8.1	4.9	No	No
CTP / U.S. 1 at Veterans Memorial Parkway (ALT 2A-2D)	45	45	6LD	6LD	8.6	5.2	8.5	5.1	No	No
CTP / U.S. 1 at Village Green Drive (ALT 1C)	45	45	6LD	6LD	8.7	5.2	8.1	4.9	No	No
CTP / U.S. 1 at Savanna Club Boulevard (ALT 6A)	45	45	6LD	6LD	9.0	5.4	8.7	5.2	No	No
CTP (Walters Terrace) / Floresta Drive (ALT 2A-2D)	45	40	6LD	4/6LD	8.0	4.8	7.8	4.7	No	No
CTP / U.S. 1 (ALT 1F / 6B)	45	45	6LD	6LD	9.0	5.4	8.8	5.3	No	No
CTP / Veterans Memorial Parkway (ALT 2A / 2D)	45	40	6LD	4LD	9.0	5.4	9.1	5.5	No	No

CTP = CROSSTOWN PARKWAY

LD = Lanes divided; L = Lanes

[8] 1-hour NAAQS is 35 ppm; 8-hour is 9 ppm.

screening model results using the CO Florida 2012 screening model are provided in the technical support document titled *Air Quality Report*. The project is located in an area, which is designated as attainment for all of the NAAQS under the criteria provided in the Clean Air Act (CAA). Therefore, the CAA conformity requirements do not apply to this project.

As noted in FHWA's Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA (Appendix B) - December 6, 2012, emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOVES2010b model, emissions of all of the priority MSATs decrease as speed increases.

Congestion due to forecasted traffic conditions in the No Build Alternative would potentially have a small but negative effect on future localized air quality, but would have a negligible effect on regional air quality in the project area. This is particularly true near the existing Prima Vista Boulevard and Port St. Lucie Boulevard bridges. The Preferred Alternative (as well as all other build alternatives), will have a small but beneficial effect on regional air quality. As discussed in Section 5.3.19 (Construction), the construction of Crosstown Parkway Extension and the bridge will cause short-term air quality impacts in the form of dust, smoke, and emissions from construction equipment. These impacts will be minimized by adhering to all state, FDOT, and local regulations.

5.3.3.1 Greenhouse Gas Emissions

The issue of global climate change is an important national and global concern that is being addressed in several ways by the federal and state governments. The transportation sector is the second largest source of total greenhouse gases (GHG) in the United States and is the greatest source of carbon dioxide (CO_2) emissions (the predominant GHG). Tailpipe emissions from the U.S. transportation sector represented 27.4 percent of total U.S. anthropogenic (human made) greenhouse gas emissions in 2011. The principal anthropogenic source of carbon emissions is the combustion of fossil fuels, which accounts for approximately 80 percent of anthropogenic emissions of carbon worldwide. Almost all (98 percent) of the transportation-sector emissions result from the consumption of petroleum products (gasoline, diesel fuel, and aviation fuel).

The transportation sector is a substantial contributor to GHG emissions in Florida, accounting for about 46 percent of CO_2 emissions statewide. The transportation sector's GHG emissions in Florida are dominated by personal vehicle travel in cars and light trucks, which account for almost two-thirds of these emissions. Other trucks account for an additional 14 percent of CO_2 emissions. Strategies have been developed and/or implemented at the federal and state levels to address transportation GHG. On July 13, 2007, Florida Governor Charles Crist established the Action Team on Energy and Climate Change (Action Team) by signing Executive Order (EO) 07-128. The Action Team was tasked with developing the Florida Climate Change Action Plan which would include strategies to reduce Florida's GHG emissions, including recommendations for proposed legislation for consideration by the Florida Legislature. Subsequent to the signing of EO 07-128, the Action Team produced two reports. The Phase 1 report, completed in November 2007, included 30 recommendations to reduce greenhouse gas emissions in Florida. The Phase 2 report, completed in October 2008, resulted in the final *Florida Action Plan on Energy and Climate Change* which included 50 separate policy recommendations as well as recommendations as

guidance to the FDEP in its development of a regulatory, market-based, cap and trade emissions limiting program.

Any of the build alternatives are expected to add a very small amount of CO_2 emissions to local, regional, national, and global emissions, in comparison to total man-made emissions. However, it is estimated that any of the build alternatives would contribute less CO_2 emissions than the No Build Alternative due to more efficient movement of vehicles, less stop-and-go traffic, and less idling time. Therefore, any of the six build alternatives, including the Preferred Alternative, will have a small, but less of an impact on climate change compared to the No Build Alternative. Nevertheless, GHG are directly related to energy use and vehicle-miles traveled so that the differences in GHG emissions among the build alternatives and the No Build Alternative will be similar.

5.3.3.2 Mobile Source Air Toxics

In addition to the criteria air pollutants for which NAAQS have been promulgated, the USEPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Mobile Source Air Toxics (MSAT) are a subset of the 188 air toxics defined by the CAA. The MSAT are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. Seven of the 188 toxics have currently been identified as priority MSAT: acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter (this list is subject to change by future changes of the USEPA rules).

The USEPA is the lead federal agency for administering the CAA and has certain responsibilities regarding the health effects of MSAT. The USEPA issued a final rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources, 66FR 172229 (March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, USEPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program, its national low emission vehicles standards, its Tier 2 motor vehicle emissions standards, and gasoline sulfur control requirements, its proposed heavy duty engine and vehicle standards, and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, even with a predicted 64 percent increase in vehicle miles traveled (VMT) on FHWA projects, on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde are expected to be reduced by 57 to 65 percent. In addition, on-highway diesel particulate matter emissions are expected to be reduced by 87 percent. As a result, USEPA concluded that no additional motor vehicle emission standards or fuel standards were necessary to further control MSAT.

The FHWA has developed an interim guidance update (FHWA Memorandum - December 6, 2012) for project level MSAT analyses based on a tiered approach of no analysis if there is no potential for meaningful MSAT effects from the project, a qualitative analysis for projects with a low potential for MSAT effects from projects that have forecasted Annual Average Daily Traffic (AADT) of less

than 140,000 vehicles, and a quantitative analysis for projects with higher potential MSAT effects that have a forecasted AADT that exceeds 140,000. The maximum AADT forecasted for this project ranges from 57,100 to 64,600 depending on the alternative. Therefore, in accordance with the FHWA interim guidance, a qualitative analysis of MSAT effects was conducted for this project.

According to the traffic data and analysis presented in the *Design Traffic Technical Memorandum* (DTTM) for this project, roadway congestion will be less under any of the build alternative scenarios, including the Preferred Alternative, compared to the No Build Alternative as evidenced by the number of key intersections and roadway segments within the traffic study area which are forecasted to operate at Level of Service (LOS) E or LOS F. In the No Build condition, in the design year of 2037, 58 percent of the key area intersections would operate at LOS E or LOS F during peak hours, and 53 percent of roadway segments would operate at LOS E or LOS F during peak hours. Under any of the build alternatives, this would drop to between 10 percent and 30 percent of key intersections, and between 13 percent and 25 percent of roadway segments, depending on the build alternative. Additionally, depending on the build alternative, within the traffic study area the system wide average speed would range from a low of 23.89 mph to a high of 24.79 mph during the PM peak hour as compared to 18.48 mph in the No Build Alternative scenario. According to the EPA's Mobile Source Emission Factor model, the MSAT emission rates for priority MSATs decrease (except for diesel particulate matter) as speed increases.

For the build alternatives under consideration, the amount of MSAT emitted is proportional to the VMT and the number of vehicles on the roadway system, assuming that other variables such as fleet mix are the same for each alternative. The VMT for build alternatives is expected to be slightly higher than for the No Build Alternative because the additional roadway capacity increases the efficiency of the roadway, increases travel speed, and reduces area congestion. While the increase in VMT would result in an overall increase in MSAT emissions, the corresponding decrease in MSAT emission rates is expected to somewhat offset the increase. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds. According to EPA's MOVES2010b model, emissions of all of the priority MSATs decrease as speed increases. As a result of the relative similarity in VMT between the build alternatives compared to the No Build Alternative, it is expected there would be no appreciable difference in overall MSAT emissions with or without the project. Additionally, it is estimated that by 2037 (the design year for this project) vehicular emissions will be less than present levels due to USEPA's national control programs that are projected to reduce annual MSAT emissions by 80 percent between 2010 and 2050[9]. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The project will locate a major roadway closer to homes in the area. West of the NFSLR, this is especially true for Alternatives 6B and 6A, and to a lesser degree Alternative 2A, which would cut diagonally through established residential neighborhoods. Also, east of the NFSLR, Alternatives

[9] FHWA Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA – December 6, 2012.

1F, 6B, and 6A would pass closer to receptors in La Buona Vita as compared to the No Build Alternative. While it is anticipated that for these alternatives there could be localized areas where the concentration of MSAT could be higher than they would be for the No Build Alternative, the magnitude and the duration of the potential increases cannot be reliably quantified because information is not available to forecast MSAT health impacts at the individual project level. The lower emission rates associated with higher speeds and reduced congestion (as compared to the No Build Alternative) could offset the higher MSAT concentrations in instances where this might occur. Also, MSAT levels will be lower along the existing Port St. Lucie Boulevard and Prima Vista Boulevard corridors where traffic will divert to the Crosstown Parkway. On a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

5.3.3.2.1 Unavailable Information for Project Specific MSAT Impact Analysis

There is an overall lack of available technical tools to predict project specific health impacts resulting from changes to emission levels from specific project impacts. This limits the assessment of the potential for MSAT emission impacts due to this project to the basic analysis presented above. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information, and as prescribed in FHWA Memorandum: *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA*, December 2006.

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The U.S. Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA*. Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the

exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA and the HEI have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information

against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

5.3.3.2.2 Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSAT

Research into the health impacts of MSAT is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses. Exposure to toxics has been a focus of a number of USEPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level.

The USEPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The USEPA Integrated Risk Information System (IRIS) is a human health assessment program that evaluates quantitative and qualitative risk information on effects that may result from exposure to environmental contaminants. The IRIS database is located online at http://www.epa.gov/iris/index.html. Except for polycyclic organic matter (POM), the following toxicity information for six of the seven priority MSATs was taken from the IRIS database Weight of Evidence Characterization. The information on POM (the seventh priority MSAT) was taken from the Technology Transfer Network Air Toxics Web Site found online at http://www.epa.gov/ttn/atw/hlthef/polycycl.html#ref1. The information on MSAT was taken verbatim from the respective websites, and provides the most current evaluation of the potential hazards and toxicology of these chemicals or mixtures.

- Polycyclic Organic Matter - The term “polycyclic organic matter” (POM) defines a broad class of compounds that includes the polycyclic aromatic hydrocarbon compounds (PAHs), of which benzo[a]pyrene is a member. POM compounds are formed primarily from combustion and are present in the atmosphere in particulate form. Sources of air emissions are diverse and include cigarette smoke, vehicle exhaust, home heating, laying tar, and grilling meat. Cancer is the major concern from exposure to POM. Epidemiologic studies have reported an increase in lung cancer in humans exposed to coke oven emissions, roofing tar emissions, and cigarette smoke; all of these mixtures contain POM compounds. Animal studies have reported respiratory tract tumors from inhalation exposure to benzo[a]pyrene and forestomach tumors, leukemia, and lung tumors from oral exposure to benzo[a]pyrene. USEPA has classified seven PAHs (benzo[a]pyrene, benz[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) as Group B2, probable human carcinogens.
- Acrolein – Under the Draft Revised Guidelines for Carcinogen Risk Assessment (USEPA, 1999), the potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or

inhalation route of exposure. There are no adequate human studies of the carcinogenic potential of acrolein. Collectively, experimental studies provide inadequate evidence that acrolein causes cancer in laboratory animals.

- Benzene – Under the proposed revised Carcinogen Risk Assessment Guidelines (USEPA, 1996), benzene is characterized as a known human carcinogen for all routes of exposure based upon convincing human evidence as well as supporting evidence from animal studies. (USEPA, 1979, 1985, 1998; ATSDR, 1997).
- 1,3-Butadiene – Under USEPA's 1999 Guidelines for Carcinogen Risk Assessment (USEPA, 1999), 1,3-butadiene is characterized as carcinogenic to humans by inhalation. This characterization is supported by the total weight of evidence provided by the following: (1) sufficient evidence from epidemiologic studies of the majority of U.S. workers occupationally exposed to 1,3-butadiene, either to the monomer or to the polymer by inhalation, showing increased lymphohematopoietic cancers and a dose-response relationship for leukemias in polymer workers (Section II.A.2), (2) sufficient evidence in laboratory animal studies showing that 1,3-butadiene causes tumors at multiple sites in mice and rats by inhalation (Section II.A.3), and (3) numerous studies consistently demonstrating that 1,3-butadiene is metabolized into genotoxic metabolites by experimental animals and humans (Section II.A.4). The specific mechanisms of 1,3-butadiene-induced carcinogenesis are unknown; however, the scientific evidence strongly suggests that the carcinogenic effects are mediated by genotoxic metabolites of 1,3-butadiene, i.e., the monoepoxide, the diepoxide, and the epoxydiol.
- Diesel Engine Exhaust – Using USEPA's revised draft 1999 Guidelines for Carcinogen Risk Assessment (USEPA, 1999), diesel exhaust (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. The basis for this conclusion includes the following lines of evidence:
  - strong but less than sufficient evidence for a causal association between DE exposure and increased lung cancer risk among workers in varied occupations where exposure to DE occurs;
  - extensive supporting data including the demonstrated mutagenic and/or chromosomal effects of DE and its organic constituents, and knowledge of the known mutagenic and/or carcinogenic activity of a number of individual organic compounds that adhere to the particles and are present in the DE gases;
  - evidence of carcinogenicity of DPM (Diesel Particulate Matter) and the associated organic compounds in rats and mice by other routes of exposure (dermal, intratracheal, and subcutaneous and intraperitoneal injection); and
  - suggestive evidence for the bioavailability of DE organic compounds from DE in humans and animals.
- Formaldehyde - Based on limited evidence in humans, and sufficient evidence in animals. Human data include nine studies that show statistically significant associations between site-specific respiratory neoplasms and exposure to formaldehyde or formaldehyde-containing products. An increased incidence of nasal squamous cell carcinomas was observed in long-term inhalation studies in rats and in mice. The classification is supported by in vitro genotoxicity data and formaldehyde's structural relationships to other carcinogenic aldehydes such as acetaldehyde.
- Naphthalene - Using the 1996 Proposed Guidelines for Carcinogen Risk Assessment, the human carcinogenic potential of naphthalene via the oral or inhalation routes "cannot be

determined" at this time based on human and animal data; however, there is suggestive evidence (observations of benign respiratory tumors and one carcinoma in female mice only exposed to naphthalene by inhalation [NTP, 1992a]). Additional support includes increase in respiratory tumors associated with exposure to 1-methylnaphthalene.

There are numerous studies that have been conducted or are under development related to MSAT health impacts in relation to the proximity to roadways. The Health Effects Institute, a non-profit organization funded by the USEPA, FHWA, and industry, recently completed (January 2010) a special report on the health effects of traffic-related air pollution titled, *Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure and Health Effects*. This study in part concluded that, "based on a synthesis of the best available evidence, an exposure zone within a range of up to 300 to 500 meters from a major road as the area most highly affected by traffic emissions…[and], that the evidence is sufficient to support a causal relationship between exposure to traffic-related air pollution and exacerbation of asthma. It also found suggestive evidence of a causal relationship with onset of childhood asthma, nonasthma respiratory symptoms, impaired lung function, total and cardiovascular mortality, and cardiovascular morbidity, although the data are not sufficient to fully support causality. For a number of other health outcomes, there was limited evidence of associations, but the data were either inadequate or insufficient to draw firmer conclusions." This study included a review of ten sources published from 2004 to 2007.

Other studies have also reported that proximity to roadways is related to adverse health outcomes (particularly respiratory problems). These studies include:

- *Multiple Air Toxic Exposure Study-II*; South Coast Air Quality Management District, 2000;
- *Highway Health Hazards* – Sierra Club, 2004; and
- *NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles* – 35 ELR 10273, Environmental Law Institute, 2005.

While not specific to MSAT the research surveyed the full spectrum of air pollutants. The FHWA cannot evaluate the validity of this research, but more importantly, the information that is available does not provide sufficient data or analysis that would be useful to alleviate the uncertainties associated with the specific health impacts associated with this project.

5.3.3.2.3 Relevance of Unavailable or Incomplete Information to Evaluating Significant Adverse Impacts

Because of the uncertainties noted above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available for larger projects, the amount of MSAT emissions from the Preferred Alternative, and MSAT concentrations or exposures created, cannot be predicted with enough accuracy to be useful in estimating health impacts. Therefore, the relevance of unavailable or incomplete information is that it is not possible to determine if the Preferred Alternative will have "significant adverse impacts on the human environment". Thus, a qualitative assessment was conducted. The assessment concluded that there would be no appreciable difference in MSAT emissions with or without the project. Further, it is anticipated that vehicular emissions with the project will be less than present levels due to EPA's emission control programs.

5.3.4 Noise

A Noise Study was conducted in accordance with Part 2, Chapter 17 (Noise) of the FDOT *PD&E Manual* and is in conformance with 23 CFR Part 772 (dated July 13, 2010). Noise sensitive sites were identified and then examined for potential noise impacts within the project area. To determine potential noise impacts due to the build alternatives, noise levels were predicted using the FHWA TNM 2.5 Traffic Noise Model. The need for potential noise barriers was considered when predicted noise levels approached or exceeded the Noise Abatement Criteria (NAC) or when a substantial increase between existing and future noise levels occurred. All potential noise barriers were evaluated under the current feasibility and reasonableness factors.

5.3.4.1 Noise Abatement Criteria

Part 2, Chapter 17 (Noise) of the FDOT *PD&E Manual* indicates that noise abatement measures must be considered when predicted noise levels approach or exceed the NAC or when they substantially exceed existing noise levels. A substantial increase in traffic noise occurs when the difference between existing and build year noise levels is at least 15 decibels dB(A). The FHWA has established the NAC for various types of land uses. The NAC defines the noise levels at which abatement is considered for five activity categories (A through E). FHWA requires states to define approach as no less than 1 decibel less that the applicable NAC in Table 1 of 23 CFR 772. Part 2, Chapter 17 (Noise) of FDOT's PD&E Manual defines approach criteria as "approaching the criteria means within 1 decibel (dB) of the appropriate FHWA abatement criteria".

The FHWA and FDOT noise abatement criteria are summarized in Table 5.14. The noise sensitive receptor locations identified in this study are characterized as single and multi-family residential locations (NAC B) which are the only receptors within the project limits that could be impacted. Therefore, the NAC used in this study is 66 dB(A) for residential land uses. There were no non-residential (NAC A, C, E) or interior (NAC D) noise receptor locations identified within the project area which could be impacted.

The rest of this page is intentionally left blank

Table 5.14 Noise Abatement Criteria in Hourly A-Weighted Sound Level-decibels [dB(A)]

Activity Category	Activity Leq(h)[1]		Evaluation Location	Description of activity category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	–	–	–	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–	–	–	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)

1 The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

2 Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

Consistent with Part 2, Chapter 17 (Noise) of the FDOT *PD&E Manual* (dated 05-24-11), potential noise abatement measures are considered when the FDOT's feasibility and reasonableness factors are met to effectively reduce the traffic noise levels at impacted receptor locations. Noise sensitive sites along the corridor consisting of single and multi-family residential homes are represented by residential receptors. An impacted receptor is a receptor that will be subject to traffic noise that approaches or exceeds the NAC or exceeds existing noise levels by 15 dB(A) or more. The noise abatement criterion for residential receptor locations (NAC B) is 66 dB(A). The Noise Reduction Factor (feasibility factor) requires that at least two or

more impacted receptors achieve a 5 dB(A) reduction or greater for a noise barrier to be considered feasible. The Noise Reduction Design Goal (reasonableness factor) requires that one or more benefited receptors achieve a 7 dB(A) reduction to be reasonable.

Both impacted and non-impacted receptors attaining 5 dB(A) or more noise reduction are considered benefited receptors. Cost reasonableness is based on a calculated cost per benefited receptor regardless of whether or not it is identified as impacted. Cost benefit calculations are used to determine if a particular noise abatement measure is potentially reasonable.

The analysis was performed for all noise sensitive sites that could be affected by the build alternatives. Residences of multi-family units and single-family homes at the same distance from, and orientation to, the roadway were represented by a single modeled noise sensitive receptor (TNM 2.5 Receiver). For Alternatives 2A and 2D, there were 5 multifamily residential dwellings, each with 4 residential units for a total of twenty actual residences. (5 TNM 2.5 Receivers which represent 20 residences). The computer modeled receptors (TNM 2.5 Receivers) for the remaining alternatives were all representative of a single noise sensitive receptor location. More specifically:

- Alternative 2A noise modeling was performed for 158 residential units represented by 143 noise sensitive receptors (138 receptors representing 138 single-family residential homes, and 5 multi-family units, each of which represent 4 residences);
- Alternative 2D noise modeling was performed for 179 residential units represented by 164 receptors (159 receptors representing 159 single-family residential homes, and 5 multi-family units, each of which represent 4 residences);
- Alternative 1C (Preferred Alternative) noise modeling was performed for 99 single-family homes represented by 99 receptors;
- Alternative 1F noise modeling was performed for 139 single-family homes represented by 139 receptors;
- Alternative 6B noise modeling was performed for 142 single-family homes represented by 142 receptors; and
- Alternative 6A noise modeling was performed for 133 single-family homes represented by 133 receptors.

Unless the area of exterior frequent use is identified elsewhere, residential receptor locations were placed at the edge of the dwelling unit closest to the major traffic noise source. First floor and second floor receptors were assumed to be placed five feet and 15 feet above ground, respectively. Residential receptors were placed at the edge of the dwelling unit closest to the major traffic noise source at a height of five feet. The minimum distance between sensitive receptors and the edge of road is generally greater for this project compared to typical arterials because of the wide right of way that replaced the existing first row of homes.

5.3.4.2 Design Year Traffic Used for Noise Model

Experience has shown that the highest traffic volume and the highest average speed usually create the noisiest conditions. This usually occurs at the LOS C traffic condition. Crosstown Parkway is a 6-lane divided Class 1 arterial with a directional LOS C service volume of 2,720 vehicles per hour (vph). The 2037

projected traffic volumes between Floresta Drive and U.S. 1 exceed 2,720 vph and therefore LOS C volumes were modeled (Table 5.15). The projected traffic volumes between Sandia Drive and Floresta Drive were lower than LOS C volumes for all build alternatives and were used in the TNM 2.5 Traffic Noise Model. Based on traffic data presented in the DTTM, the percentage split between heavy trucks and medium trucks was equal. There was no information available for buses and motorcycles so they were not considered in the study.

Table 5.15 2037 Traffic Volumes Used in the TNM 2.5 Traffic Noise Model

ROADWAY SEGMENT			2037 PM PEAK HOUR TRAFFIC VOLUMES				
			1C	1F/6B	2A	2D	6A
CROSSTOWN PARKWAY (FLORESTA DRIVE TO US-1)	LOS C (6LD)	PEAK DIR	2720	2720	2720	2720	2720
	YEAR 2037 EIS VOLUMES	PEAK DIR	3364	3488	3893	3818	3224
	PEAK DIR VOLUMES	TNM INPUT	2720	2720	2720	2720	2720
	All 3 directional lanes	CARS	2556	2556	2556	2556	2556
	6%	M TRUCKS	82	82	82	82	82
	TRUCK	H TRUCKS	82	82	82	82	82
	1st Thru Lane	CARS	852	852	852	852	852
	DIRECTIONAL	M TRUCKS	28	28	28	28	28
		H TRUCKS	28	28	28	28	28
	2nd+3rd Thru Lanes	CARS	1704	1704	1704	1704	1704
	DIRECTIONAL	M TRUCKS	54	54	54	54	54
		H TRUKS	54	54	54	54	54
	CHECK		2720	2720	2720	2720	2720
CROSSTOWN PARKWAY (SANDIA DR TO FLORESTA DRIVE)	LOS C (6LD)	PEAK DIR	2720	2720	2720	2720	2720
	YEAR 2037 EIS VOLUMES	TWO-WAY	2889	3249	2979	2376	3249
	YEAR 2037 (1/2 Two-Way)	PEAK DIR	1445	1625	1490	1188	1625
	PEAK DIR VOLUMES	TNM INPUT	1445	1625	1490	1188	1625
	All 3 directional lanes	CARS	1358	1528	1401	1117	1528
	6%	M TRUCKS	44	48	44	35	48
	TRUCK	H TRUCKS	43	49	45	36	49
	1st Thru Lane	CARS	453	509	467	372	509
	DIRECTIONAL	M TRUCKS	15	16	15	12	16
		H TRUCKS	14	16	15	12	16
	2nd+3rd Thru Lanes	CARS	905	1019	934	745	1019
	DIRECTIONAL	M TRUCKS	29	32	29	23	32
		H TRUCKS	29	33	30	24	33
	CHECK		1445	1625	1490	1188	1625

Table 5.15 2037 Traffic Volumes Used in the TNM 2.5 Traffic Noise Model (Continued)

ROADWAY SEGMENT			2037 PM PEAK HOUR TRAFFIC VOLUMES				
			1C	1F/6B	2A	2D	6A
US-1	LOS C (6 LD)	PEAK DIR	2720	2720	2720	2720	2720
	YEAR 2037 EIS VOLUMES	PEAK DIR	2749	3412	2816	2744	3251
	PEAK DIR VOL	TNM INPUT	2720	2720	2720	2720	2720
	PEAK TWO-WAY VOLUMES	TNM INPUT	5440	5440	5440	5440	5440
	6% TWO-WAY	CARS	5112	5112	5112	5112	5112
		M TRUCKS	164	164	164	164	164
		H TRUCKS	164	164	164	164	164
	CHECK		5440	5440	5440	5440	5440
FLORESTA DRIVE (ALL EXCEPT 2D)	LOS C (4 LD/6LD)	TWO-WAY	3300	3300	3300	4950	3300
	YEAR 2037 EIS VOLUMES	TWO-WAY	1854	1854	1719	3879	1944
	PEAK TWO-WAY VOLUMES	TNM INPUT	1854	1854	1719	3879	1944
	4% TWO-WAY	CARS	1780	1780	1650	3724	1866
		M TRUCKS	37	37	35	77	39
		H TRUCKS	37	37	34	78	39
	CHECK		1854	1854	1719	3879	1944
FLORESTA DRIVE (ALT 2D ONLY)	YEAR 2037 (1/2 Two-Way)	PEAK DIR	927	927	860	1940	972
	All 3 directional lanes 6% TRUCK	CARS	871	871	808	1824	914
		M TRUCKS	28	28	26	58	29
		H TRUCKS	28	28	26	58	29
	1st Thru Lane DIRECTIONAL	CARS	290	290	269	608	305
		M TRUCKS	9	9	9	19	10
		H TRUCKS	9	9	9	19	10
	2nd+3rd Thru Lanes DIRECTIONAL	CARS	581	581	539	1216	609
		M TRUCKS	19	19	17	39	19
		H TRUCKS	19	19	17	39	19
	CHECK		927	927	860	1940	972

NOTES:

- The percentage of trucks was assumed divided equally between medium trucks (M Trucks) and heavy trucks (H Trucks) based on traffic data provided in the DTTM.

The rest of this page is intentionally left blank

5.3.4.3 Model Validation

Field noise measurements were established to validate the TNM 2.5 Traffic Noise Model. Noise measurements were established 50 feet east of Floresta Drive and half a block north of West Virginia Drive between 4:00 p.m. and 6:00 p.m. on Thursday, May 14, 2009 using a CEL-383 integrating impulse sound level meter and a CEL-282 acoustical calibrator. Three 10-minute noise measurements were acquired in accordance with FHWA and FDOT guidelines. Traffic volumes were counted separately for the northbound and southbound directions. Traffic composition, including light trucks, heavy trucks, and motorcycles, was identified for each noise measurement. The average travel speed was between 35 mph and 37 mph. Using the information collected in the field at the measurement site (including traffic volume, composition and speed), the TNM 2.5 model was loaded with the same input data to determine how well the TNM 2.5 modeled output would correlate with the actual measured values. The results of the model validation are summarized in Table 5.16. Field measurements are contained in the technical support document titled *Noise Study Report* which is available at the City of Port St. Lucie Engineering Department located at 121 S.W. Port St. Lucie Boulevard, Port St. Lucie, FL 34984-5099. The maximum variance between field measurements and TNM 2.5 predicted noise levels is 0.4 dB(A), well within the ±3.0 dB(A) allowed by FDOT guidelines.

Table 5.16 TNM 2.5 Model Validation Results

Noise Measurements	Field Measured Noise Level dB(A)	TNM Modeled Noise Level dB(A)	Difference Between Measured and TNM Modeled Noise Level dB(A)
Measurement 1	63.0	62.9	-0.1
Measurement 2	62.5	62.4	-0.1
Measurement 3	62.1	62.5	+0.4

5.3.4.4 Predicted Noise Levels

The predicted noise levels were developed using the TNM 2.5 Traffic Noise Model for the Design Year 2037 and were developed with a high level of refinement including lane-by-lane modeling, acceleration lanes, edge of pavement, bridge curbs, bridge structure, embankments, ground types, terrain elevations, cross streets, ponds, and the NFSLR. Traffic information was based on the DTTM.

The TNM 2.5 Traffic Noise Model was utilized to develop the base condition as well as evaluating noise barrier heights from 6 to 16 feet with 2-foot increments. The barrier analysis included consideration of diminishing returns. For example, in some instances, noise barrier heights up to 20 feet were evaluated but the noise barrier analysis determined that optimal noise barrier heights were within that six to 16 feet range. The barrier analysis results provided insertion losses for various wall heights and identified benefited receptors. An expanded and more detailed discussion of the noise analysis is contained in the *Noise Study*

Report. The TNM 2.5 Traffic Noise Model run data, including noise level projections, barrier analyses, model validation, and contour plots are included in the project files.

5.3.4.5 Noise Barrier Analysis

The noise barrier analysis to potentially mitigate noise levels at impacted receptor locations was performed in accordance with Part 2, Chapter 17 (Noise) of the FDOT *PD&E Manual.* The TNM 2.5 Traffic Noise Model was utilized to predict future noise levels at all noise sensitive sites as a result of traffic on Crosstown Parkway. The cost reasonableness criteria was based on the recommended statewide average cost of $30 per square foot of barrier and a maximum cost of $42,000 per benefited receptor as described in Chapter 17 (Noise) of the *PD&E Manual.*

For impacted receptors where it was found to be feasible and reasonable to construct a noise barrier that could provide at least a 5 dB(A) noise reduction at two or more benefited receptors (feasibility factor) and at least 7 dB(A) at one or more benefited receptors (reasonableness factor), and where that noise barrier met the cost criteria, those impacted receptors are shown and referred to as "impacted receptors benefited" on Figures 5.8 through 5.25. Solid lines on the figures depict proposed noise barriers and "impacted receptors benefited" are depicted with a yellow circle surrounding a red circle. Impacted receptors which *could* have benefited from a noise barrier that was determined to be feasible but not reasonable from a cost perspective, are also shown on the figures as "impacted receptors benefited." The dashed lines on the figures depict noise barriers that are not cost reasonable. However, in the text the "impacted receptors benefited" that are behind noise barriers that were determined to be not cost reasonable are counted as "impacted receptors not-benefited". In addition to the impacted receptors where a noise barrier was determined not to be cost reasonable, some impacted receptors could not achieve a 5 dB(A) reduction regardless of whether or not a noise barrier was found to be cost reasonable. These receptors would still be impacted after mitigation and are referred to as "impacted receptors not-benefited". They are depicted on the figures with a red circle surrounding a yellow circle. The analysis results for all proposed noise barriers are summarized in Table 5.17.

Alternative 2A would impact 33 receptors (Figure 5.8, Figure 5.9, and Figure 5.10). The noise barrier analysis identified five noise barriers (W1, W2A, W2B, W3A and W3B) that met the feasibility and reasonableness factors and one noise barrier (W4) that did not meet the cost factor (Table 5.17). The reasonable and feasible barriers vary in height between eight and 13 feet and would have a total length of 2,524 feet. The total cost for the five reasonable and feasible barriers was estimated to be $851,760. The recommended noise barriers for Alternative 2A would benefit 29 of 33 impacted receptors (leaving four impacted receptors non-benefited). Noise barrier W2A would benefit three additional non-impacted receptors (70N1, 73N1, and 76N1) located across the street from the impacted receptors north of where the Crosstown Parkway Extension would intersect with Veterans Memorial Parkway (Figure 5.10). The average noise reduction for all benefited receptors would be 7.3 dB(A).

The rest of this page is intentionally left blank

Table 5.17 Noise Barrier Evaluation Summary

WALL	LOCATION	RECEPTORS	LENGTH	HEIGHT	IMPACTED UNITS	BENEFITED RECEPTORS [1] UNITS IMPACTED	BENEFITED RECEPTORS [1] UNITS NOT IMPACTED	BENEFITED RECEPTORS [1] TOTAL UNITS	NOISE REDUCTION (AVG) IMPACTED BENEFITED	NOISE REDUCTION (AVG) ALL BENEFITED	TOTAL BARRIER COST	COST PER B.R.	COST REASONABLE < $42,000/BR
ALT-2A													
W1	NORTHSIDE - EAST OF FLORESTA	REC 36-41	708 FT	8 FT	5	5	0	5	6.5	6.5	$169,920	$33,984	YES
W2A & W2B	NORTHSIDE - WEST OF U.S. 1	REC 64-79	936 FT	13 FT	9	8	3	11	8.7	7.9	$365,040	$33,185	YES
W3A & W3B	SOUTHSIDE - WEST OF U.S. 1 MULTIFAMILY UNITS [2]	REC 139-143	880 FT	12 FT	16	16	0	16	7.1	7.1	$316,800	$19,800	YES
W4	NORTHSIDE - WEST OF FLORESTA	REC 30-34	504 FT	12&17 FT	3	2	1	3	6.0	6.1	$221,940	$73,980	NO
	SUBTOTAL - COST REASONABLE		2,524 FT		30	29	3	32	7.4	7.3	$851,760		
	SUBTOTAL - COST UNREASONABLE		504 FT		3	2	1	3	6.0	6.1	$221,940		
	TOTAL				33	31	4	35					
	Does not meet the Feasibility or Reasonability Criteria [3]	REC 48-51, 53-58,											
ALT-2D		137, 129, 130, 31			14								
W2A & W2B	NORTHSIDE - WEST OF US-1	REC 80-96	938 FT	13 FT	9	8	3	11	8.9	8.0	$365,820	$33,256	YES
W3A &W3B	SOUTHSIDE - WEST OF U.S. 1 MULTIFAMILY UNITS [2]	REC 160-164	880 FT	12 FT	16	16	0	16	7.1	7.1	$316,800	$19,800	YES
	SUBTOTAL - COST REASONABLE		1,818 FT		25	24	3	27	7.7	7.5	$682,620		
	SUBTOTAL - COST UNREASONABLE												
	TOTAL				39	24	3	27					
ALT-1C													
W1	NORTHSIDE - EAST OF FLORESTA	REC 35-41	809 FT	10 FT	6	6	0	6	6.0	6.0	$242,700	$40,450	YES
W2	SOUTHSIDE - EAST OF FLORESTA	REC 85-91	665 FT	10 FT	4	4	2	6	6.3	6.0	$199,500	$33,250	YES
	SUBTOTAL - COST REASONABLE		1,474 FT		10	10	2	12	6.1	6.0	$442,200		
	SUBTOTAL - COST UNREASONABLE												
	TOTAL				10	10	2	12					
ALT-1F	Does not meet the Feasibility or Reasonability Criteria [3]	REC 81, 86, 100			3								
W1	NORTHSIDE -EAST OF FLORESTA	REC 36-41	809 FT	10 FT	7	6	0	6	6.0	6.0	$242,700	$40,450	YES
W2	NORTHSIDE - WEST OF US-1	REC 51-69&123-139	1,364 FT	8&14 FT	36	29	0	29	8.3	8.3	$479,460	$16,533	YES
W3	SOUTHSIDE - EAST OF FLORESTA	REC 107-112	665 FT	11 FT	5	5	1	6	6.5	6.3	$219,450	$36,575	YES
	SUBTOTAL - COST REASONABLE		2,838 FT		48	40	1	41	7.7	7.7	$941,610		
	SUBTOTAL - COST UNREASONABLE												
	TOTAL				51	40	1	41					
	Does not meet the Feasibility or Reasonability Criteria [3]	REC 89, 94, 38, 108,											
ALT-6B		42			5								
W1	NORTHSIDE - WEST OF PRESTON	REC 18,19	256 FT	9 FT	2	2	0	2	7.1	7.1	$69,120	$34,560	YES
W2A, 2B & 2C	NORTHSIDE - WEST OF US-1	REC 56-77&130-142	1,405 FT	8,14,12 FT	37	30	0	30	8.3	8.3	$464,100	$15,470	YES
	SUBTOTAL - COST REASONABLE		1,661 FT		39	32		32	8.2	8.2	$533,220		
	SUBTOTAL - COST UNREASONABLE												
	TOTAL				44	32	0	32					
	Does not meet the Feasibility or Reasonability Criteria [3]	REC 71, 76, 31, 59,											
ALT-6A		56, 57, 58			7								
W1	NORTHSIDE - WEST OF PRESTON LN	REC 18,19	226 FT	9 FT	2	2	0	2	7.3	7.3	$61,020	$30,510	YES
W3	NORTHSIDE - EAST OF FLORESTA	REC 34-47	1,608 FT	12 FT	8	6	3	9	7.4	6.8	$578,880	$64,320	NO
W5	SOUTHSIDE - WEST OF FLORESTA	REC 88-90	408 FT	9 FT	3	3	0	3	6.4	6.4	$110,160	$36,720	YES
W6	SOUTHSIDE - EAST OF FLORESTA	REC 98-105	969 FT	12 FT	4	4	1	5	7.5	7.0	$348,840	$69,768	NO
W7	SOUTHSIDE - EAST OF FLORESTA	REC 116-133	912 FT	12 FT	18	13	0	13	7.3	7.3	$328,320	$25,255	YES
	SUBTOTAL - COST REASONABLE		1,546 FT		23	18	0	18	7.2	7.2	$499,500		
	SUBTOTAL - COST UNREASONABLE		2,577 FT		12	10	4	14	7.4	6.9	$927,720		
	TOTAL				42	28	4	32					

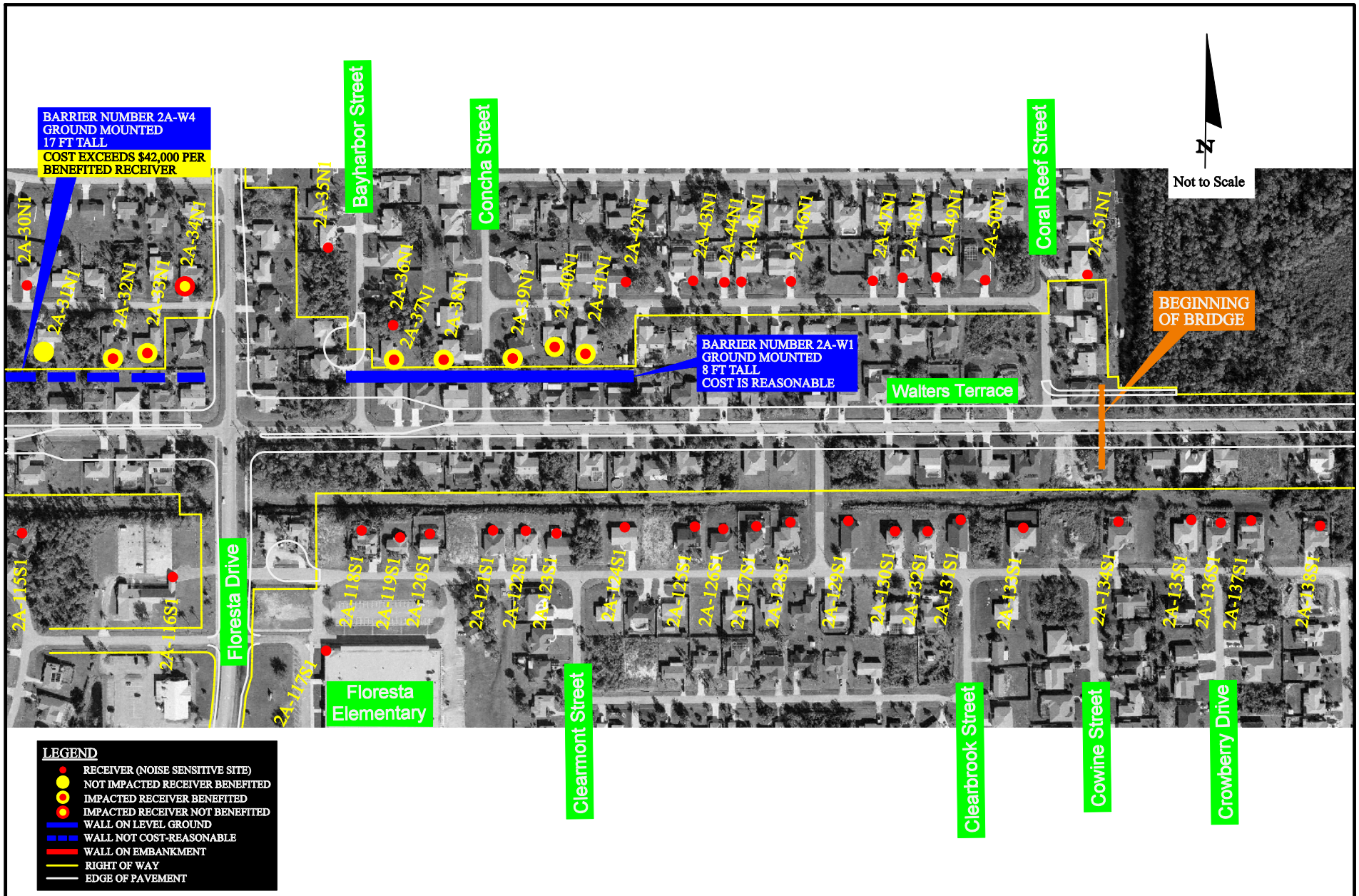
NOTES:
[1] "BENEFITED RECEPTORS" ARE RECEPTORS WHICH RECEIVE AT LEAST 5 dB(A) OR MORE NOISE REDUCTION FROM A SPECIFC NOISE ABATEMENT MEASURE (NOISE BARRIER PLACEMENT).
[2] ALT 2A & 2D HAVE 5 RECEPTORS EACH REPRESENTING 4 UNITS IN A MULTIFAMILY RESIDENTIAL BUILDING. ALL OTHER RECEPTORS REPRESENT SINGLE FAMILY HOMES.
[3] EITHER A SINGLE ISOLATED RECEPTOR OR THE RECEPTORS DO NOT ACHIEVE THE FEASIBILITY CRITERION OF 2 RECEPTORS ACHIEVING AT LEAST A 5 dB(A) NOISE REDUCTION, AND THE REASONABLENESS CRITERION OF 1 RECEPTOR ACHIEVING AT LEAST 7 dB(A) NOISE REDUCTION.

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2A (1 of 3)

Figure 5.8

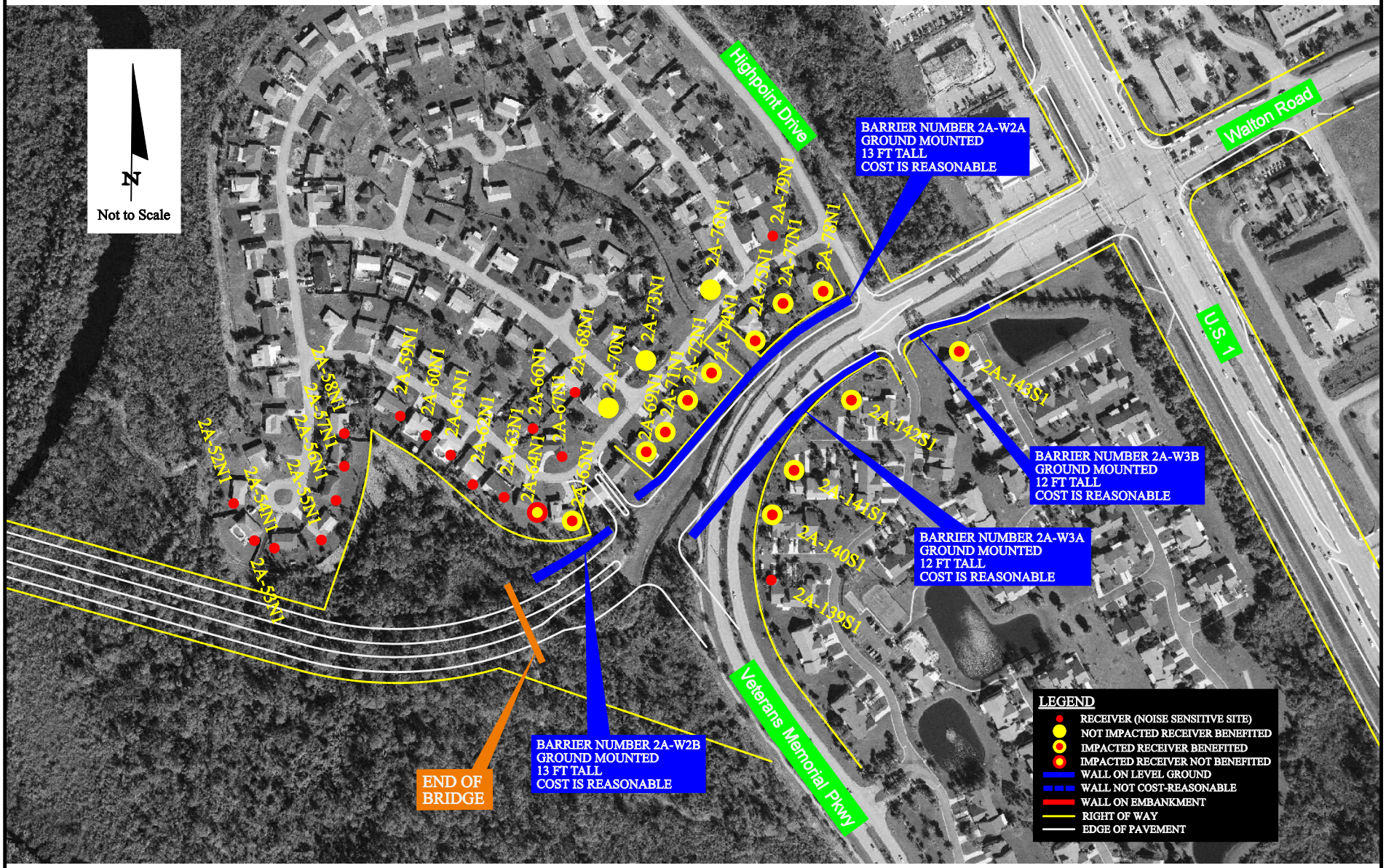


FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2A (2 of 3)

Figure 5.9



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2A (3 of 3)

Figure 5.10

One receptor (64N1) would not achieve a feasible and reasonable benefit by barrier W2B, because of its location relative to where the proposed bridge would come down to ground level. This receptor is located northwest of where the Crosstown Parkway Extension would intersect with Veterans Memorial Parkway (Figure 5.10). Three receptors (32N1, 33N1, and 34N1) could benefit from noise barrier W4, but the cost of the noise barrier would exceed the cost reasonable factor (Table 5.17). These three receptors are located northwest of where the Crosstown Parkway Extension intersects Floresta Drive (Figure 5.9).

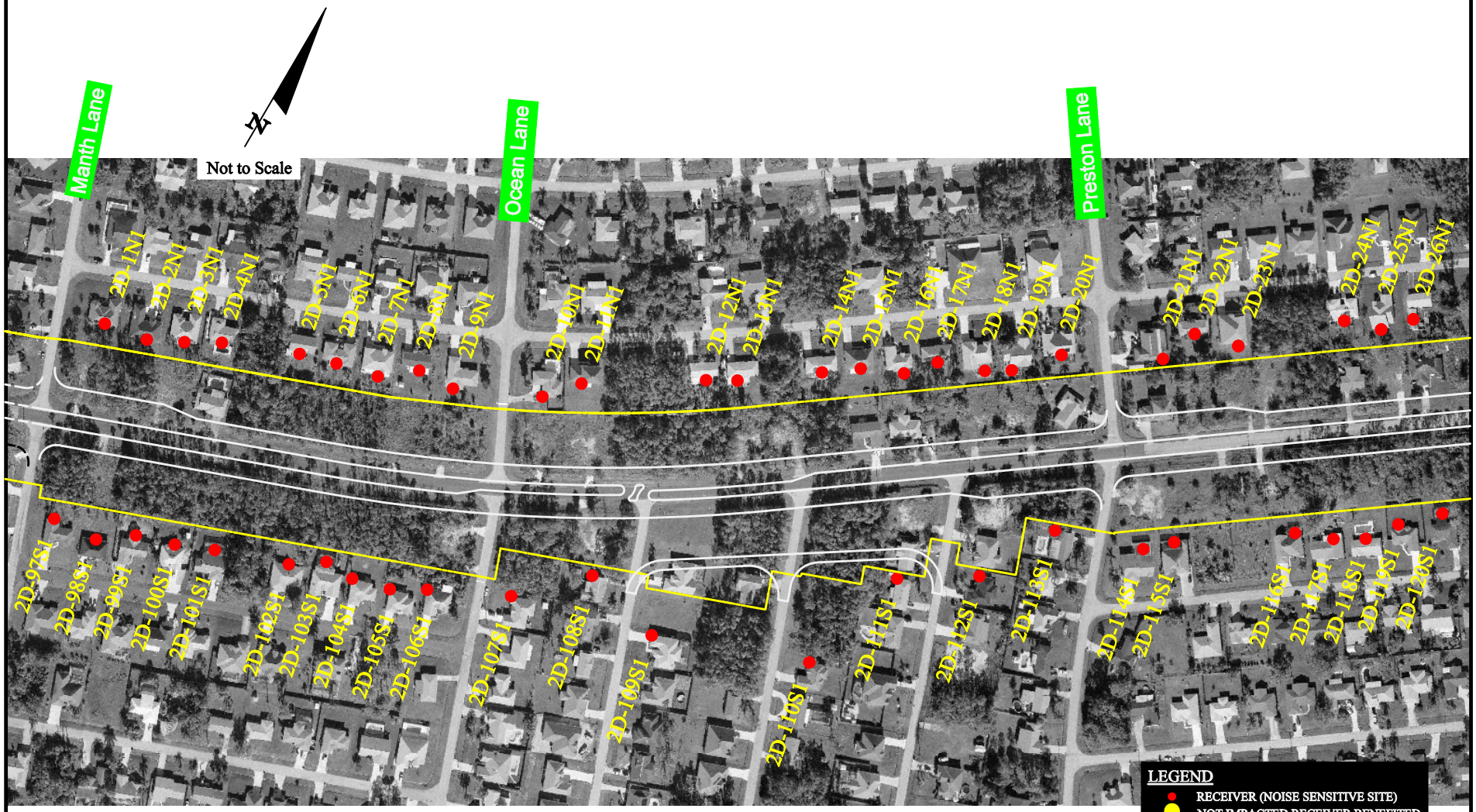
Alternative 2D would impact 39 receptors (Figure 5.11 through Figure 5.14). The noise barrier analysis identified four noise barriers (W2A, W2B, W3A, and W3B) that met the feasibility and reasonableness factors and five noise barriers (W1,W4, W5, W6, and W7) that did not meet the feasibility and reasonableness factors (Table 5.17). The reasonable and feasible noise barriers vary in height between 12 and 13 feet and would have a total length of 1,818 feet. The total cost for the four feasible and reasonable noise barriers was estimated to be $682,620. The recommended noise barriers for Alternative 2D would benefit 24 of 39 impacted receptors (leaving 15 impacted non-benefited receptors). Noise barrier W2A would benefit three additional non-impacted receptors (87N1, 90N1, and 93N1) located across the street from the impacted receptors north of where Crosstown Parkway Extension intersects with Veterans Memorial Parkway (Figure 5.14). The average noise reduction for all benefited receptors would be 7.5 dB(A).

One receptor (81N1) of the 15 impacted non-benefited receptors would not achieve a feasible and reasonable benefit by noise barrier W2B, but would only receive a minimal benefit because of the location of the receptor relative to where the bridge comes to grade. This receptor is located northwest of where the Crosstown Parkway Extension intersects with Veterans Memorial Parkway (Figure 5.14).

Alternative 1C would impact ten receptors (Figure 5.15 and Figure 5.16). The noise barrier analysis identified two noise barriers (W1 and W2) that met the feasibility and reasonableness factors and no noise barriers that were not reasonable and feasible (Table 5.17).

Both of the reasonable and feasible noise barriers would have a height of ten feet and would have a total length of 1,474 feet. The total cost for the two reasonable and feasible noise barriers was estimated to be $442,200 (the lowest cost for noise barriers out of all the build alternatives). The recommended noise barriers for Alternative 1C would benefit all ten impacted receptors (there would be no impacted non-benefited receptors) making this the only build alternative which could provide all impacted receptors with noise barriers that meet the feasibility and reasonableness factors. Additionally, noise barrier W2 would benefit two non-impacted receptors (89S1 and 90S1) located on the south side of the Crosstown Parkway Extension on the approach to the NFSLR (Figure 5.16). The average noise reduction for all benefited receptors would be 6.0 dB(A) with one receptor achieving 7.0 dB(A) of noise reduction. Alternative 1C would not impact any noise sensitive sites east of the River.

Alternative 1F would impact 51 receptors (Figure 5.17, Figure 5.18, and Figure 5.19), including some second row receptors located behind those receptors that are directly adjacent to the Crosstown Parkway Extension. The noise barrier analysis identified three noise barriers (W1, W2, and W3) that met the feasibility and reasonableness factors and three noise barriers (W4, W5, and W6) that did not meet the feasibility factor (Table 5.17). The barriers vary in height between 8 and 14 feet and would have a total length of 2,838 feet. The total cost for the three reasonable and feasible barriers was estimated to be

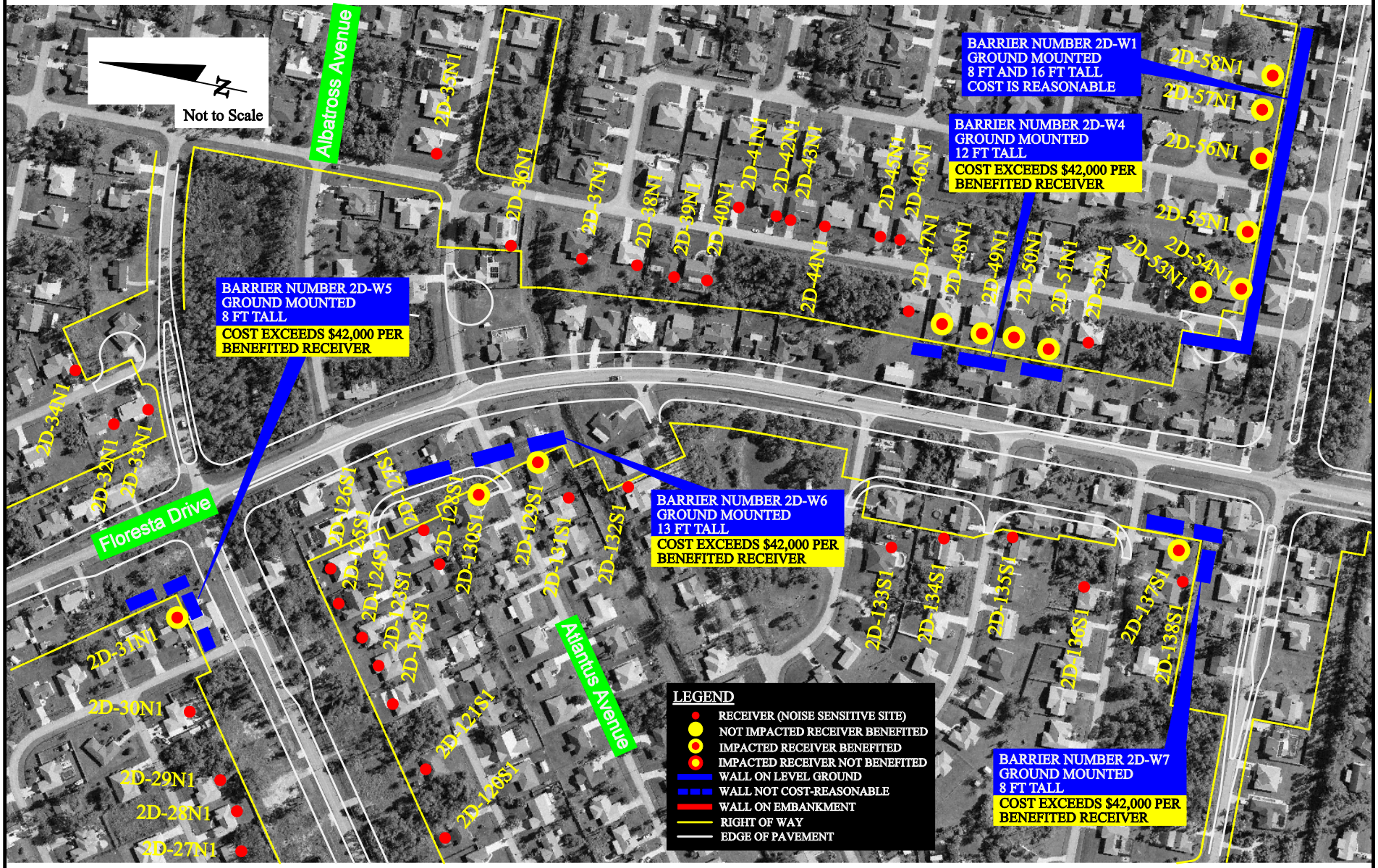


FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2D (1 of 4)

Figure 5.11



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2D (2 of 4)

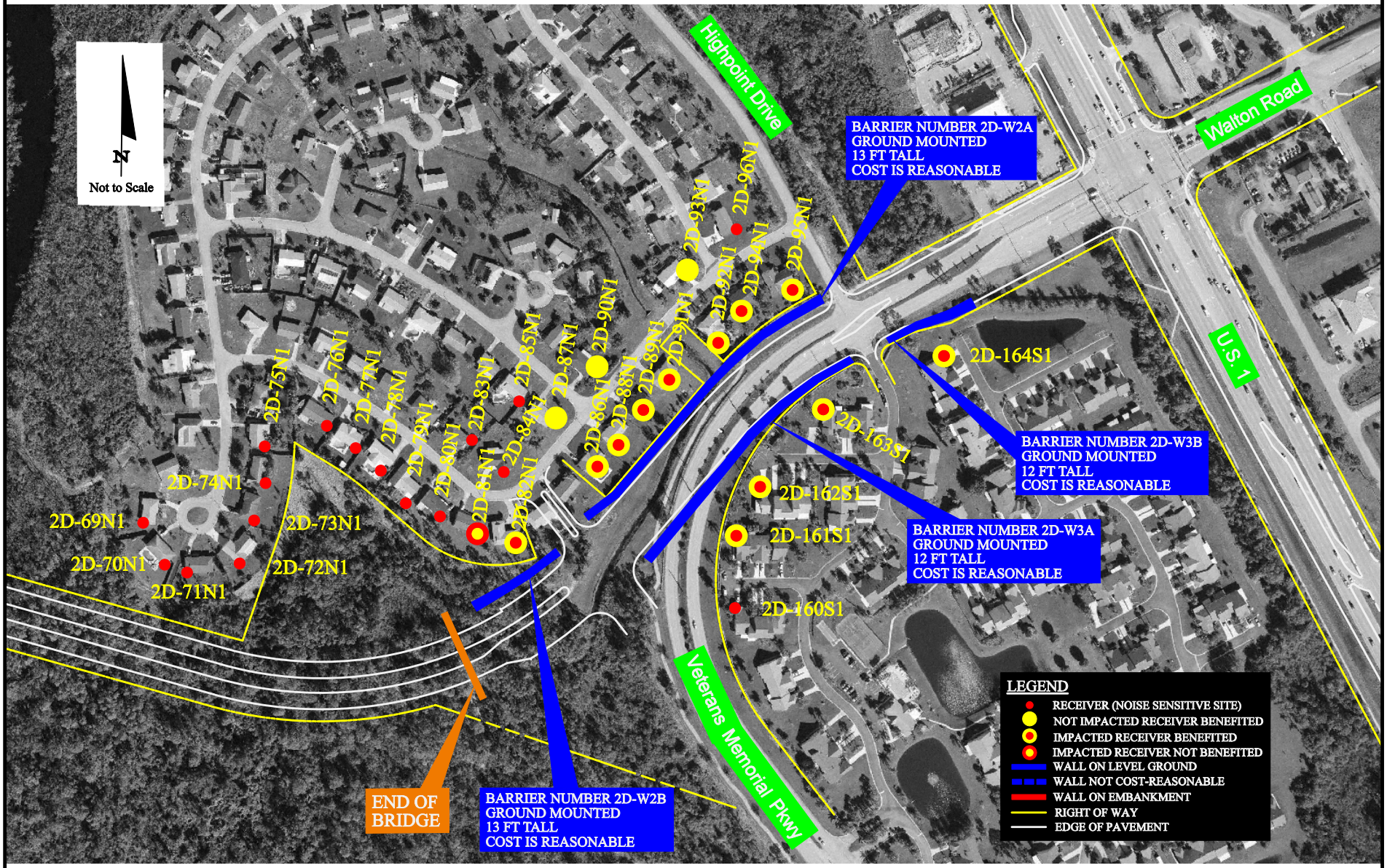
Figure 5.12

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2D (3 of 4)

Figure 5.13

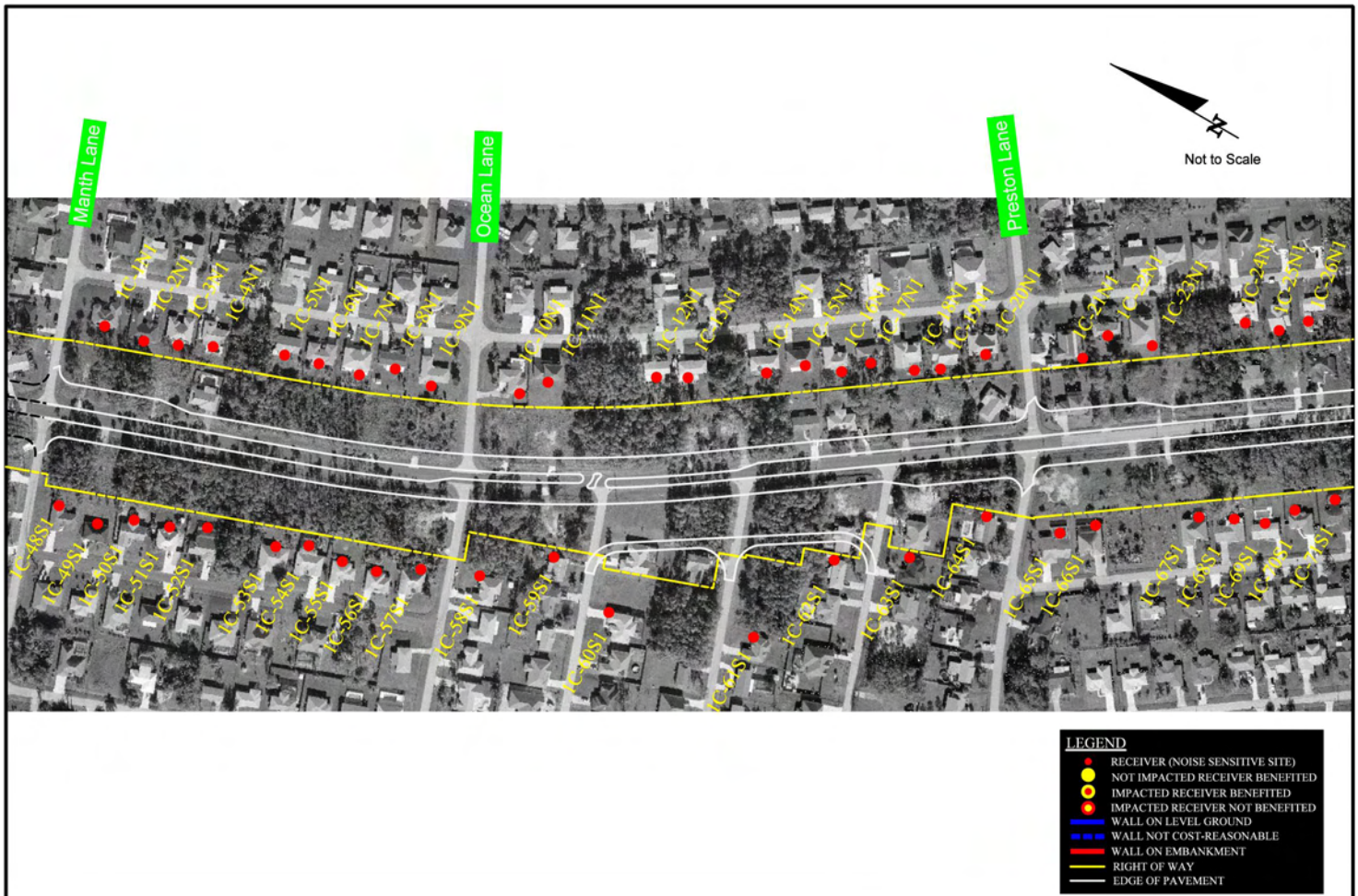


FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 2D (4 of 4)

Figure 5.14



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 1C (1 of 2)

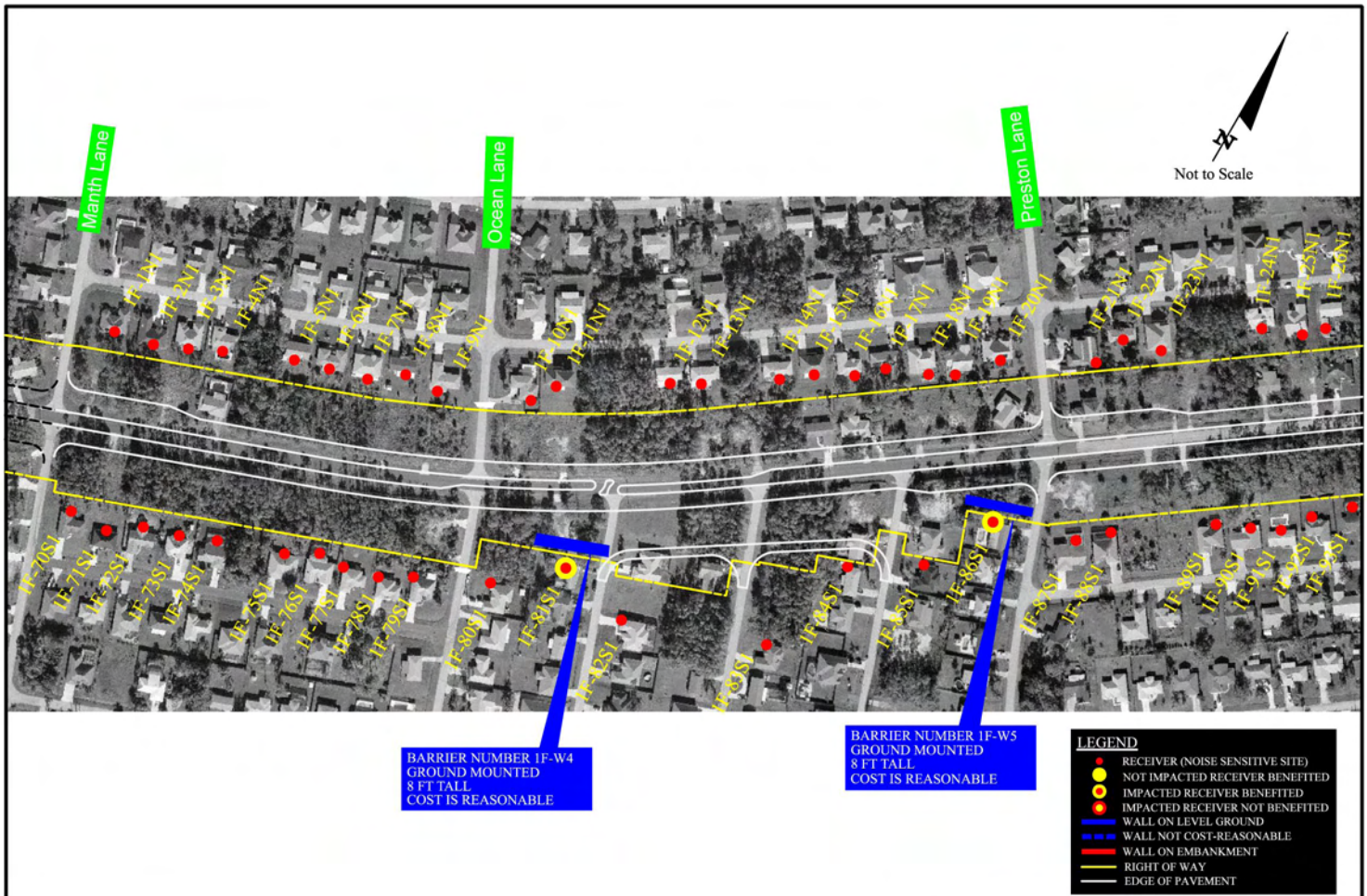
Figure 5.15

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 1C (2 of 2)

Figure 5.16



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 1F (1 of 3)

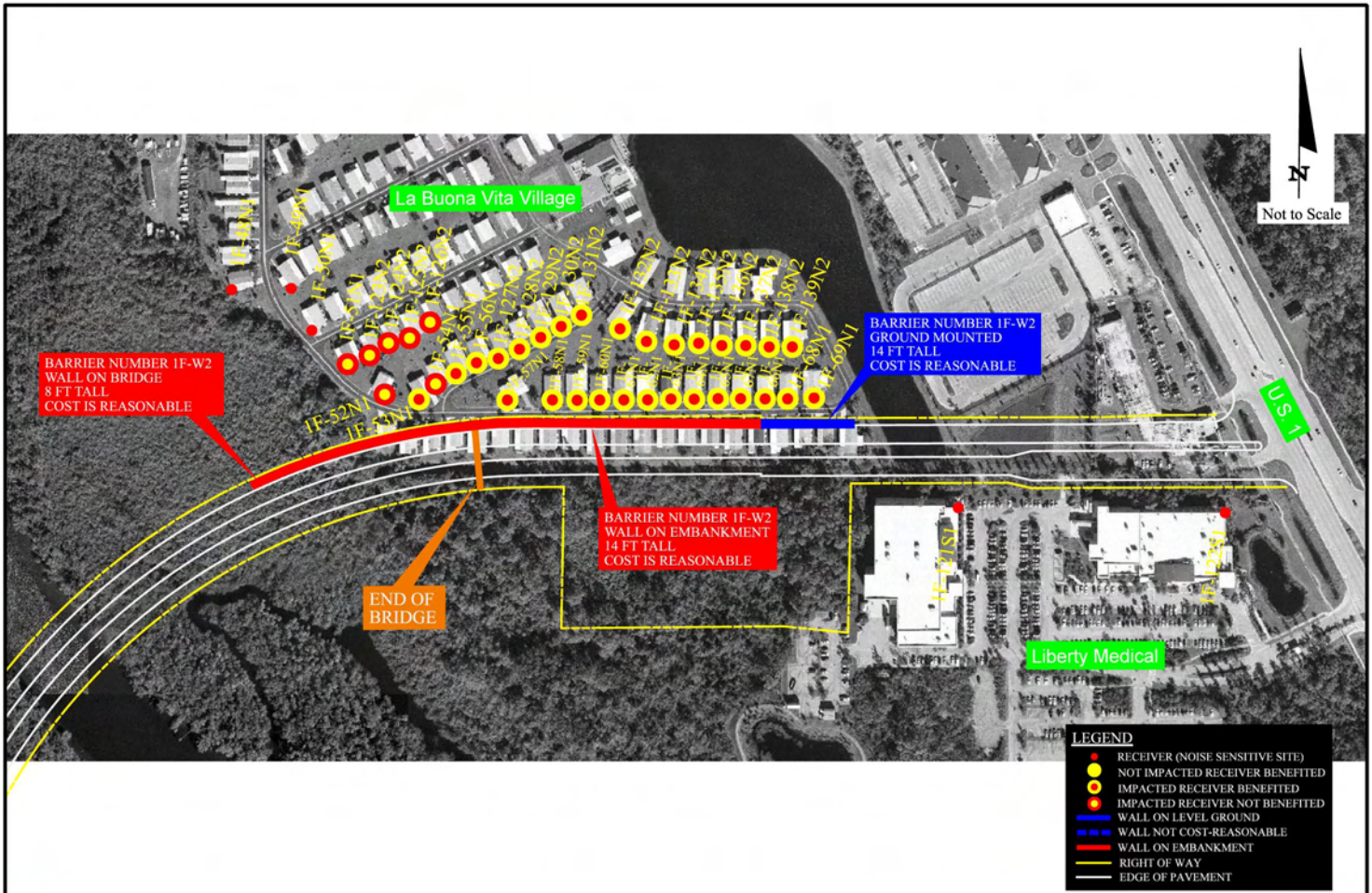
Figure 5.17

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and
Environmental Impact Statement

Noise Study Alternative 1F (2 of 3)

Figure 5.18



5.69

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 1F (3 of 3)

Figure 5.19

$941,610 (the highest cost for noise barriers out of all the build alternatives). The recommended noise barriers for Alternative 1F would benefit 40 of 51 impacted receptors leaving 11 impacted non-benefited receptors. Noise barrier W3 would benefit one additional non-impacted receptor (112S1) located on the south side of the Crosstown Parkway Extension on the approach to the NFSLR (Figure 5.18). The average noise reduction for all benefited receptors would be 7.7 dB(A).

One impacted receptor (42N1) would not achieve a feasible and reasonable benefit by noise barrier W1. To fully benefit this receptor, the noise barrier would need to be extended to a point where the noise barrier would no longer be cost reasonable. This receptor is located along the north side of the Crosstown Parkway Extension on the approach to the NFSLR (Figure 5.18). Seven impacted receptors (51N1, 52N1, 54N1, 123N2, 124N2, 125N2, and 126N2) would not achieve a feasible and reasonable benefit by noise barrier W2. These receptors would not be benefited because of their proximity and position relative to the bridge approach and their distance from the noise barrier. These receptors are located in La Buona Vita (Figure 5.19).

Alternative 6B would impact 44 receptors (Figure 5.20, Figure 5.21 and Figure 5.22), including some second row receptors located behind those receptors that are directly adjacent to the Crosstown Parkway Extension. The noise barrier analysis identified two noise barriers (W1 and W2A-2B-2C that met the feasibility and reasonableness factors and four noise barriers (W3, W4, W5, and W6) that did not meet the feasibility factor (Table 5.17). It should be noted that W2A, W2B, and W2C (W2A-2B-2C) are treated as one noise barrier consisting of a ground-mounted segment, an embankment-mounted segment, and a bridge-mounted segment. The reasonable and feasible noise barriers vary in height between eight and 14 feet and would have a total length of 1,661 feet. The total cost for the two reasonable and feasible noise barriers was estimated to be $533,220. The recommended noise barriers for Alternative 6B would benefit 32 of 44 impacted receptors, (leaving 12 impacted non-benefited receptors). The average noise reduction at all benefited receptors would be 8.2 dB(A).

Seven of the impacted receptors (58N1, 59N1, 126N2, 127N2, 128N2, 129N2, and 142N2) would not achieve a feasible and reasonable benefit by noise barrier W2A-2B-2C. These receptors would not be benefited because of their proximity and position relative to the proposed bridge approach and their distance from the proposed noise barrier. These receptors would be located in La Buona Vita (Figure 5.22).

Alternative 6A would impact 42 receptors (Figure 5.23, Figure 5.24, and Figure 5.25). The noise barrier analysis identified three noise barriers (W1, W5, and W7) that met the feasibility and reasonableness factors and two noise barriers (W3 and W6) that did not meet the cost reasonableness factor (Table 5.17). Additionally, noise barriers (W2, W4, W8, and W9) did not meet the noise reduction factor (feasibility factor). The three reasonable and feasible noise barriers vary in height between nine and 12 feet and would have a total length of 1,546 feet. The total cost for the five barriers was estimated to be $499,500. The recommended noise barriers for Alternative 6A would only benefit 18 out of 42 impacted receptors, leaving 24 impacted non-benefited receptors (the highest number of impacted non-benefited receptors out of all build alternatives). The average noise reduction for all benefited receptors would be 7.2 dB(A).

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 6B (1 of 3)

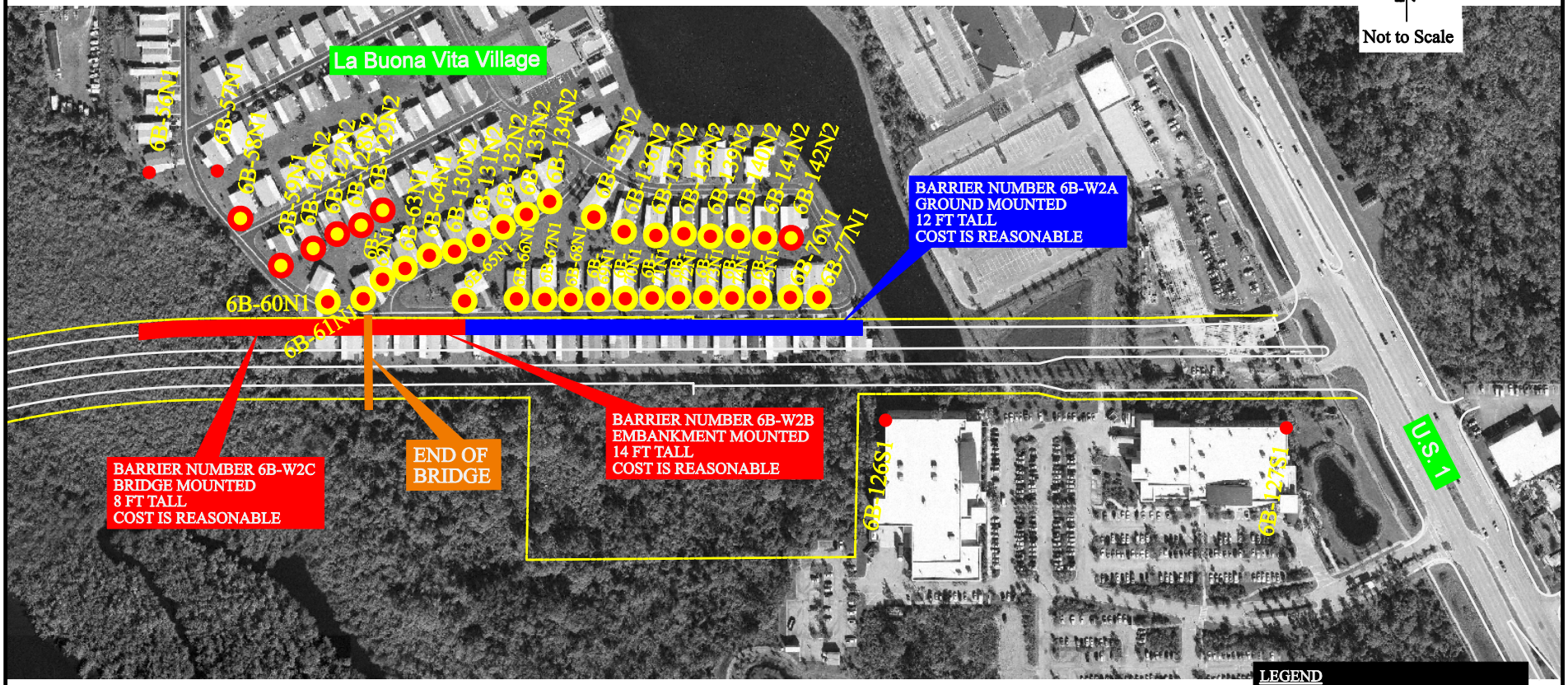
Figure 5.20

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and
Environmental Impact Statement

Noise Study Alternative 6B (2 of 3)

Figure 5.21



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and
Environmental Impact Statement

Noise Study Alternative 6B (3 of 3)

Figure 5.22

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 6A (1 of 3)

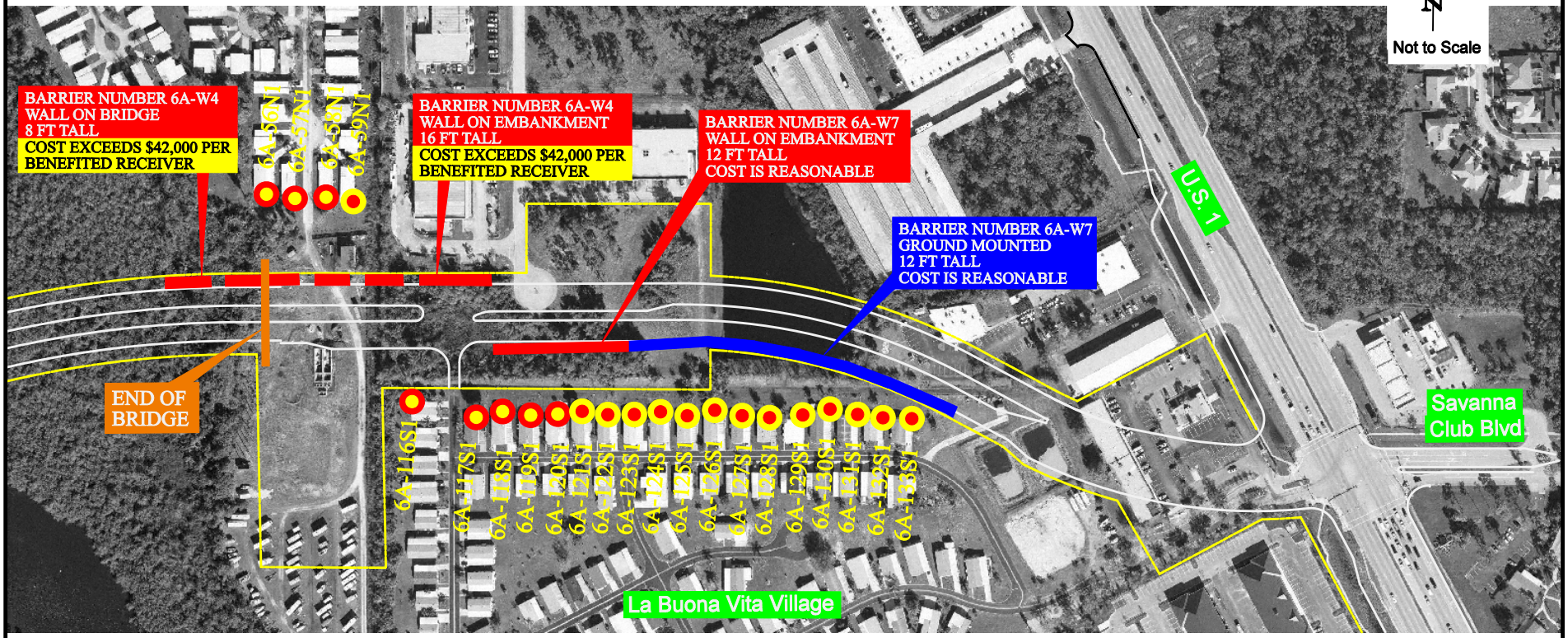
Figure 5.23

FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and
Environmental Impact Statement

Noise Study Alternative 6A (2 of 3)

Figure 5.24



FM No. 410844-1-28-01
FP No. 7777-087-A
ETDM No. 8247

Crosstown Parkway Extension PD&E Study and Environmental Impact Statement

Noise Study Alternative 6A (3 of 3)

Figure 5.25

Five receptors (116S1, 117S1, 118S1, 119S1, and 120S1) of the 24 impacted non-benefited receptors would not achieve a feasible and reasonable benefit by barrier W7, due to the proximity of the receptors to where the bridge would come down to grade. In addition, they would be exposed to noise from eastbound traffic along the Crosstown Parkway Extension coming off the bridge. These receptors are located at the northwest corner of La Buona Vita (Figure 5.25).

Ten of the impacted non-benefited receptors could benefit from barriers W3 and W6, but the cost of the noise barriers would exceed the cost reasonable factor (Table 5.17). These ten receptors are: 36N1, 38N1, 40N1, 43N1, 45N1, and 47N1, located north of the Alternative 6A Crosstown Parkway Extension alignment east of Floresta Drive (Figure 5.24); and 98S1, 100S1, 101S1, and 104S1, which are located south of the Alternative 6A Crosstown Parkway Extension alignment east of Floresta Drive (Figure 5.24).

Alternative 6A would impact the largest number of residences west of the River due to its diagonal alignment between Floresta Drive and the NFSLR. The noise barrier analysis found that this alternative would result in 24 out of 42 impacted receptors without effective noise abatement measures.

Alternatives 1F and 6B would have the greatest impact on La Buona Vita since the majority of non-benefited receptors along those alternatives are located in that community, near the elevated section of the bridge. Alternatives 2A and 2D have similar impacts to each other. However Alternative 2A provides reasonable and feasible noise abatement to all but four impacted receptors located near Floresta Drive. Alternative 2D would result in 15 impacted receptors non-benefited, most of which are located along Floresta Drive. Alternative 1C has the lowest noise impact because it does not impact any noise sensitive sites east of the River and it is a relatively straight alignment. It would provide reasonable and feasible abatement for all ten impacted receptors. Table 5.18 summarizes the noise study analysis results for each alternative, identifying the number of noise sensitive sites, impacted receptors, benefited and non-benefited receptors, and the noise barrier cost.

5.3.4.6 Noise (Preferred Alternative)

The Preferred Alternative will impact ten receptors, all of which are residential dwellings. The impacted receptors are located along the north and south sides of the Preferred Alternative, between Floresta Drive and Coral Reef Street. The noise barrier analysis determined that two, 10-foot high noise barriers could benefit all ten of these receptors. Both walls were determined to be reasonable and feasible. The noise barriers will be constructed for the Preferred Alternative at the noise-impacted locations contingent upon the following conditions:

- Subsequent to any significant design changes, the noise analysis conducted during final design continues to support the need, feasibility, and reasonableness for providing abatement;
- Community input during the design phase supporting the types, height and locations of the noise barriers is provided to the District office; and
- An assessment of the impact of noise barriers on billboards that may be affected has already been made and no billboards were found to be blocked by noise barriers. A final determination of impacted billboards will be made based on the final design vertical and horizontal alignments. Public involvement related to billboards will occur in accordance with Section 479.25, F.S.

Table 5.18 Summary of Noise Analysis Results

CROSSTOWN PARKWAY DESIGN ALTERNATIVE	NOISE SENSITIVE SITES		TOTAL NUMBER OF IMPACTED RECEPTORS	BENEFITED RECEPTORS [3]			IMPACTED RECEPTORS NOT BENEFITED [4]	TOTAL NUMBER OF RECOMMENDED WALLS	TOTAL COST OF WALLS
	MODELED RECEPTORS [1]	RESIDENTIAL UNITS [2]		UNITS IMPACTED	NOT IMPACTED	TOTAL UNITS			
ALT-2A	143	158	33	29	3	32	4	5	$851,760
ALT-2D	164	179	39	24	3	27	15	4	$682,620
ALT-1C	99	99	10	10	2	12	0	2	$442,200
ALT-1F	139	139	51	40	1	41	11	3	$941,610
ALT-6B	142	142	44	32	0	32	12	4	$533,220
ALT-6A	133	133	42	18	0	18	24	3	$499,500

NOTES:
[1] NOISE SENSITIVE SITES REPRESENTS RESIDENTIAL UNITS. EACH SINGLE FAMILY UNIT IS REPRESENTED BY ONE RECEPTOR.
[2] ALT 2A & 2D HAVE 5 RECEPTORS EACH REPRESENTING 4 MULTIFAMILY RESIDENTIAL UNITS. ALL OTHER RECEPTORS REPRESENT SINGLE FAMILY HOMES.
[3] "BENEFITED RECEPTORS" ARE RECEPTORS WHICH RECEIVE AT LEAST 5 dB(A) OR MORE NOISE REDUCTION FROM A SPECIFIC NOISE ABATEMENT MEASURE (NOISE BARRIER PLACEMENT).
[4] "IMPACTED RECEPTORS NOT BENEFITED" ARE RECEPT0RS THAT WOULD EXPERIENCE NOISE IMPACTS THAT COULD NOT BE MITIGATED BY A NOISE REDUCTION METHOD.

The detailed noise analyses and the public coordination to be conducted during detailed design are a project commitment [Section 9.0 (Commitments and Recommendations)].

5.3.5 Wetlands

All wetlands within the project area have been identified as jurisdictional wetlands by the USACE and the South Florida Water Management District (SFWMD). Wetland boundaries within the rights of way for all build alternatives, including the Preferred Alternative, have been field verified by these agencies. In compliance with Section 404 of the Clean Water Act, 1972 as amended in 1979, and Section 10 of the Rivers and Harbor Act of 1899, an individual permit will be required from the USACE. In addition, an Environmental Resource Permit (ERP) will be required by the SFWMD to authorize work within wetlands and Sovereignty Submerged Lands (SSL).[10] Extensive coordination with federal and state agencies has been ongoing throughout the EIS process regarding wetlands and other regulatory issues.

The project area is located within the Indian River Lagoon South (IRL–S) - North Fork Natural Floodplain Restoration [Comprehensive Everglades Restoration Plan (CERP)] Project. The USACE has determined that the Preferred Alternative is compatible with goals and objectives of the CERP project.[11]

Fourteen Assessment Areas[12] (AA) were identified within the project area and were described in Section 4.3.5 (Wetlands). All build alternatives, including the Preferred Alternative, will have various direct, indirect, temporary, and cumulative wetland impacts[13] depending on the alternative. The conceptual design plans (Appendix H) were used to quantify wetland impacts for direct and temporary impacts, based on the limits of these types of disturbance, for each alternative.

5.3.5.1 Direct Impacts (Wetlands)

Direct impacts to wetlands are defined as those effects caused by the action and occurring at the same time and place (40 CFR 1508.8). For all build alternatives, including the Preferred Alternative, direct impacts include placement of fill for the bridge approaches and portions of right of way to be acquired, placement of fill at the locations of bridge pilings, shading under the bridge, and construction and excavation of stormwater pond sites. Shading under the built bridge will cause a change in vegetation structure and composition (as well as habitat fragmentation) and is considered a direct impact. While information regarding bridge shading impacts on forested or wetland habitats is scarce, two studies examined bridge shading on ground-dwelling invertebrates and salt marsh vegetation in North Carolina.

[10] A Conceptual Permit Application has been submitted by the City to the SFWMD. Its purpose was to determine if an easement to cross state lands could be granted and to determine the type and quantity of mitigation required. An ERP authorizing construction will be obtained during detailed design .

[11] Email from the USACE, dated August 2, 2012 (Appendix A).

[12] An AA was defined as a polygon mapped for wetland habitats (habitat types for the FLUCCS and USFWS classification systems), which resulted in 14 AAs (Figure 4.12).

[13] All of the build alternatives, including the Preferred Alternative, cross state-owned SSL and require an easement authorization. SSL are considered "deep water habitats" under USFWS definitions (non-wetlands) and are defined in Florida Statutes as lands below the mean high water. These lands are equivalent to the boundaries of the AP (also the boundaries of SSL). The easement will be included in any state permit approvals for the project.

These studies did not examine the effects of bridge shading on shrub or tree communities and no other studies that examined these communities were found (see the *Wetlands Evaluation Report* for a detailed discussion of shading effects). Based on this literature, it is likely that the bridge will cause moderate to deep shading conditions in the wetland communities directly under the bridge, but it is anticipated that at least some wetland functions (primarily hydrological) would remain.

Direct impacts for each habitat type for each build alternative were calculated as the area (in acres) between the 157-foot right of way lines from the conceptual design drawings (Table 5.19; Figure 5.26). In other words, the area beneath the bridge that would be shaded was treated as if it were a filled causeway. In reality, all build alternatives, including the Preferred Alternative, would be constructed over the NFSLR as a roadway elevated on piers. Following the selection of Alternative 1C as the Preferred Alternative, additional avoidance and minimization measures were developed to reduce the impacts to wetlands, listed species habitats, and essential fish habitat. These additional measures are described in Section 5.3.5.5 [Wetland Impacts (Preferred Alternative)].

The area within the 157-foot right of way under the bridge was considered a direct impact (due to shading) and was quantified in acres (Table 5.19; Figure 5.26). Functional loss was calculated using the Uniform Mitigation Assessment Method (UMAM) for direct and indirect impacts for each build alternative.

Under the No Build Alternative, no changes would be made to the existing roadway system, no bridge would be constructed, and this alternative would have no direct impacts on wetlands. Table 5.19 quantifies the acreage of direct and temporary impacts calculated for each build alternative and its impacts on each AA. All build alternatives affect jurisdictional wetlands but vary in the amount affected. Alternative 1C has the largest amount of direct impact on wetlands (10.10 acres) followed by Alternative 1F (9.02 acres). Alternatives 6B, 2A/2D (these two alternatives would have identical effects within the NFSLR because they use the same alignment to cross the River), and 6A have approximately the same acreage of direct impacts with 8.0, 7.64, and 7.69 acres, respectively.

5.3.5.2 Indirect Impacts (Wetlands)

Indirect impacts to wetlands are defined as those effects caused by the action but occurring later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include effects related to changes in the pattern of land use, population density or growth rate as planned for in the Comprehensive and Long Range Transportation Plans for the area, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8). These induced actions are those that would not or could not occur except for the implementation of a project. These actions are often referred to as "but for" actions. The term "indirect effect" is often used interchangeably with the term "secondary effects."

Indirect impacts for wetlands were evaluated by using UMAM. A number of factors were considered in the estimation of UMAM scores (e.g., noise, introduction of weedy or invasive species, light emissions) and these types of impacts are described in this section. UMAM can estimate the functional loss[14] (and ultimately, mitigation requirements) for indirect (and direct) impacts. On December 17, 2008 and January

[14] Functional loss is determined by multiplying the impact delta by the acres of impact. Impact delta is determined by subtracting the score for the wetland with the project (with project) from the score for existing conditions (without project).

Table 5.19 Summary of Direct and Temporary Wetland Impacts (acres) Calculated for Each Build Alternative

Assessment Area	Habitat Type	Alternative 2A/2D[15]							
		Direct					Temporary		
		Fill	Ponds	Pilings[16]	Shade	Total	Pilings[16]	Trestle	Total
AA1	Mangrove Swamps	-	-	0.005	0.30	0.30	0.032	0.004	0.004
AA2	FW Marsh Shrubs Brush Vines	-	-	-	-	0.00	-	-	0.00
AA3	Stream and Lake Swamps	-	-	-	-	0.00	-	-	0.00
AA4	Stream and Lake Swamps	-	-	-	-	0.00	-	-	0.00
AA5	FW Marsh Shrubs Brush Vines	-	-	-		0.00	-	-	0.00
AA6	Freshwater Marsh	-	-	-	-	0.00	-	-	0.00
AA7	Stream and Lake Swamps	-	-	0.012	1.02	1.02	0.078	0.009	0.009
AA8	Freshwater Marsh	-	-	0.010	1.33	1.33	0.070	0.007	0.007
AA9	FW Marsh Shrubs Brush Vines	-	-	0.031	2.86	2.86	0.204	0.026	0.026
AA10	Mixed Wetland Hardwoods	-	-	-	-	0.00	-	-	0.00
AA11	Freshwater Marsh	0.23	0.94	0.005	0.31	1.48	0.031	0.005	0.005
AA12	Willow and Elder	-	-	-	-	0.00	-	-	0.00
AA13	Mixed Wetlands Hardwoods	-	0.03	0.006	0.46	0.49	0.039	0.005	0.005
AA14	Stream and Lake Swamps	-	-	-	0.16	0.16	-	-	0.00
Total		0.23	0.97	0.069	6.44	7.64	0.45	0.06	0.11

Note: Table 5.19 shows the impacts due to the 157-foot right of way that was used to evaluate the alternatives. Following the selection of Alternative 1C as the Preferred Alternative, additional avoidance and minimization measures were developed to reduce the impacts to wetlands, listed species habitats, and essential fish habitat. These additional measures are described in Section 7.1.1 (Additional Avoidance and Minimization Measures for the Preferred Alternative).

[15] Alternatives 2A and 2D would have identical wetland effects within the NFSLR because they are on the same alignment across the NFSLR.

[16] Impacts from pilings (direct impacts and temporary impacts during the placement of piles) are located beneath the bridge. Impacts beneath the bridge have been calculated as a direct (shading) impact. Thus, the area of the pilings is shown but not included in the totals (all alternatives).